# Report To Policy Committee On URM List Validation

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## Executive Summary

The City, led by the Seattle Department of Construction and Inspections (Seattle DCI—formerly DPD), has been working for many years on developing a program whereby unreinforced masonry (URM) buildings would be required to be seismically upgraded, or demonstrate they meet a proposed standard for seismic resistance.

Unreinforced masonry buildings (URMs) have proven over the years and around the world to be the most vulnerable buildings in an earthquake. Periodically over the past twenty years, Seattle DCI has worked to identify the unreinforced masonry buildings in the city. The purpose of the studies has been to provide information to the department to use to aid recovery in the event of an earthquake. In every large earthquake around the world URMs are severely damaged, and sometimes, cause deaths and injuries. It is important to reduce their vulnerability for a wide variety of reasons:

- 1160 URMs citywide
- 17% are un-retrofitted, 1 story, commercial buildings
- Median building is 2 stories
- 54% of the square footage of URM buildings retrofitted to some degree
- Rate of retrofit higher in the greater downtown area

- **Safety**: Falling bricks from these URMs pose a safety hazard to building occupants, as well as passers-by on the adjacent streets.
- **Economics**: Aside from the direct loss of workplaces and jobs, damaged URMs slow recovery of neighborhoods by blocking off access points.
- **Equity**: Anecdotally, many URMs house low income and immigrant tenants and business owners, so these more vulnerable populations could be disproportionately affected by the loss of these buildings.
- **Environment**: Preserving these buildings would preserve the embodied energy contained in them, as well as reduce the volume of construction materials introduced into the waste stream.
- **Community Character**: Losing these URMs, in many cases, would lead to a loss of historic character in their community, or their potential to serve as an anchor for recovery.

Seattle DCI has compiled a list of URM buildings from various surveys performed over the years. The current estimate of URM buildings in Seattle is approximately 1,160 URMs scattered around the city and concentrated in historic districts such as the Chinatown/International District (CID) and Pioneer Square. Based on available permit records, 11%, by square footage, of all the URM buildings have received a "substantial alteration" since 2000. Substantial alteration is a permitting term for addressing the majority of the building code deficiencies in a building including seismic upgrades. Most, but not all, substantial alterations result in the building being upgraded to a level that exceeds the proposed technical standard for the URM Policy. We estimate that up to 54% of the building stock square footage (38% of the buildings) has been retrofitted to some extent. However, the retrofit might not meet the current proposed technical standard. The rates of retrofit are higher in the greater downtown area with

a 16% substantial alteration rate in terms of square footage, and approximately 58% more retrofitted to a lesser degree.

A Technical Committee developed a proposed seismic retrofit standard for the City of Seattle in 2008-9 similar to California's "Bolts-plus." In 2012 a Policy Committee was convened to develop recommendations for a mandatory retrofit program based on the proposed Technical Standard. Their draft recommendations were prepared early in 2013 (see *Draft Recommendations from the URM Policy Committee* on the project website at www.seattle.gov/dpd/urm). Recommendations included what types of buildings would be required to be retrofit, a schedule for compliance, and potential incentives or tools to help owners complete the work. At the last URM Policy Committee meeting in April 2014, the committee asked the department to validate Seattle DCI's existing list of potential URMs in the city to provide more information for their final recommendations.

In spring of 2015, Seattle DCI hired a structural engineer to confirm potential URMs on the list, add newly discovered URMs, remove non-URMs and buildings that have been demolished, and estimate the level of retrofit. The rest of this document provides detail on the URM list and the list validation.

# 1 Introduction

## 1.1 Definition of Unreinforced Masonry

For the purposes of these studies and the proposed ordinance, the definition of unreinforced masonry is a building that contains any unreinforced, red brick or clay tile bearing walls. The following building types are specifically excluded: concrete frame buildings with unreinforced masonry filling the spaces between the beams and columns (called an unreinforced masonry infill building), unreinforced concrete masonry unit (a.k.a. “concrete block”) buildings, and concrete or steel frame buildings with unreinforced masonry curtain walls. Based on this definition, Seattle DCI estimates that there are approximately 1160 URM buildings in Seattle.

## 1.2 Previous Work

Since 1993 there have been nine discrete efforts made to attempt to identify the URM buildings in Seattle. The 2007 Reid Middleton study and the 3 Seattle DCI (DPD) studies (2009, 2012, and 2015) have focused solely on URM buildings. This report summarizes the work of the 2015 Seattle DCI (2015 DPD Maps) study. See Appendix C: Descriptions of Previous Studies for a description of the focus of each study. Buildings were also reported to Seattle DCI by members of the public (structural engineers) and reported to the URM team by other members of the department. In the mid 2000’s there was an interdepartmental effort led by the Department of Finance and Administrative Services to identify the city owned URMs. The results of this effort were also merged into the list of suspected URMs. These three categories are shown in the last three columns of Table 1.

## 1.3 Current Work

Several of the previous studies focused on individual neighborhoods as can be seen in the following table. The 2009 Seattle DCI (DPD) study was the first to look at the city as a whole locating an additional 250 buildings. In 2012, Seattle DCI re-surveyed some neighborhoods which had not been adequately reviewed in 2009. This survey yielded another 250 buildings. In 2015, Seattle DCI hired an engineer to validate the URM list. Through this effort an additional 300 buildings were added to the list. During the 2015 effort, buildings were also removed from the list because of duplicate data, demolition, and determination that they were not URMs. Table 1 illustrates the number of URMs identified in each survey.

## Table 1 Number of URMs by Neighborhood and Study

| Neighborhood | Grand Total | 1993 Preuss | 1993 SSBS | 1994 Cynthia Hoover | 1995 EQE | 2001 Reid Middleton | 2007 Reid Middleton | 2009 DPD | 2012 DPD | 2015 DPD Maps | DPD | Reported | URM City List |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alki/Admiral | 4 | | | | | | 3 | 1 | | | | | |
| Ballard | 70 | | 12 | | | 36 | | 2 | | 20 | | | |
| Beacon Hill | 6 | | | | | | | 6 | | | | | |
| Belltown | 72 | | | | | 2 | | | 58 | 11 | | | 1 |
| Broadview/Bitter Lake | 2 | | | | | | | 1 | | 1 | | | |
| Capitol Hill | 142 | | | 23 | | | 33 | | 70 | 16 | | | |
| Cascade/Eastlake | 73 | | | 1 | | 1 | | | 57 | 13 | | | 1 |
| Cedar Park/Meadowbrook | 2 | | | | | | | 2 | | | | | |
| Central Area/Squire Park | 24 | | | | 2 | | 11 | 3 | | 6 | | | 2 |
| Columbia City | 27 | | | 18 | | | 4 | 2 | | 1 | 2 | | |
| Downtown | 61 | | | | | 16 | | | 10 | 33 | | | 2 |
| Duwamish/SODO | 79 | | | | | 37 | | 20 | 2 | 20 | | | |
| Fauntleroy/Seaview | 11 | | | | | | | 5 | | 6 | | | |
| First Hill | 44 | | | 13 | | | | | 18 | 13 | | | |
| Fremont | 14 | | | 3 | | | | 9 | | 1 | | | 1 |
| Georgetown | 20 | | | | | | | 12 | | 8 | | | |
| Green Lake | 22 | | | | 1 | | 2 | 12 | | 7 | | | |
| Greenwood/Phinney Ridge | 30 | | | | | | | 21 | | 9 | | | |
| Highland Park | 1 | | | | | | | | | 1 | | | |
| Interbay | 5 | | | | | | | 3 | | 2 | | | |
| Judkins Park | 13 | | | | | | | 3 | 4 | 6 | | | |
| Laurelhurst/Sand Point | 10 | | | | | | | 1 | | 9 | | | |
| Licton Springs | 4 | | | | | | | 4 | | | | | |
| Madison Park | 6 | | | | | | | 2 | | 4 | | | |
| Madrona/Leschi | 11 | | | | | | | 8 | | 3 | | | |
| Magnolia | 1 | | | | | | | 1 | | | | | |
| Miller Park | 11 | | | | | | | 4 | 1 | 6 | | | |
| Montlake/Portage Bay | 5 | | | | | | 1 | 3 | | 1 | | | |
| Mt. Baker/North Rainier | 5 | | | | | | | 3 | | 2 | | | |
| North Beacon Hill/Jefferson Park | 8 | | | | | | | 3 | 2 | 3 | | | |
| North Capitol Hill | 10 | | | | | | 1 | | 4 | 5 | | | |
| North Delridge | 3 | | | | | | | | | 2 | | | 1 |
| Northgate/Maple Leaf | 4 | | | | | | | 2 | | 2 | | | |
| Olympic Hills/Victory Heights | 1 | 1 | | | | | | | | | | | |
| PS/CID | 122 | | | | | 83 | | | 14 | 24 | | 1 | |
| Queen Anne | 79 | | | | | | | 40 | 17 | 21 | | 1 | |
| Rainier Beach | 4 | | | | | | | 1 | | 3 | | | |
| Ravenna/Bryant | 17 | | | | | | | 9 | | 8 | | | |
| Roxhill/Westwood | 4 | | | | | | | 3 | | 1 | | | |
| Seward Park | 2 | | | | | | | 1 | | 1 | | | |
| South Beacon Hill/New Holly | 1 | | | | | | | 1 | | | | | |
| South Park | 4 | | | | 1 | | | 1 | | 2 | | | |
| Sunset Hill/Loyal Heights | 6 | | | | | | | 5 | | 1 | | | |
| Univ Dist | 74 | | | | | | 14 | 43 | | 17 | | | |
| Wallingford | 21 | 1 | | 12 | | | 1 | 5 | | 2 | | | |
| West Seattle Junction/Genesee Hill | 20 | | | | | | 9 | 5 | | 6 | | | |
| Whittier Heights | 7 | | | | | | | 3 | | 4 | | | |
| **Grand Total** | **1162** | **2** | **12** | **70** | **4** | **175** | **79** | **250** | **257** | **301** | **2** | **2** | **8** |

# 2 Summary of URM Building Information

## 2.1 Location of Buildings

The approximately 1160 URMs are located throughout the city. They tend to be concentrated in the older commercial cores in the city.

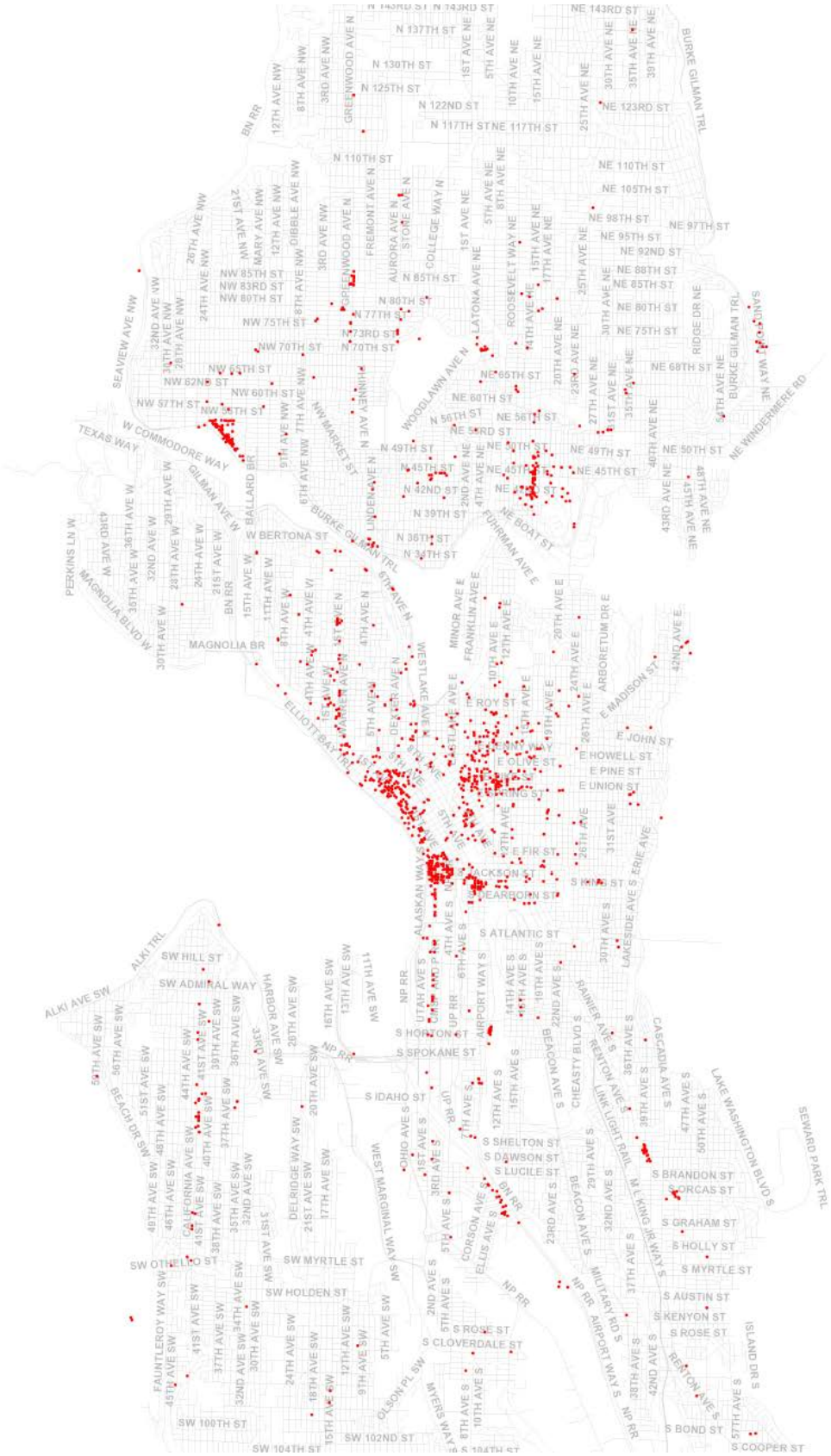
In order to help with data analysis and visualization, the URMs are listed by neighborhood. The neighborhood boundaries are those of the Community Reporting Areas that are shown in the City of Seattle GeoCortex (GIS). These neighborhoods are mapped in Appendix E: Map of Neighborhoods.

Included in Figure 1 through Figure 16 are several different representations of the distribution of the URMs throughout the city. Figure 1 and Figure 2 show the whole city, while Figure 4 through Figure 16 show the greater downtown area (including Downtown, Belltown, Cascade/Eastlake, Capitol Hill, First Hill, and Pioneer Square/Chinatown International District), Ballard, Columbia City, Georgetown, and the University District.

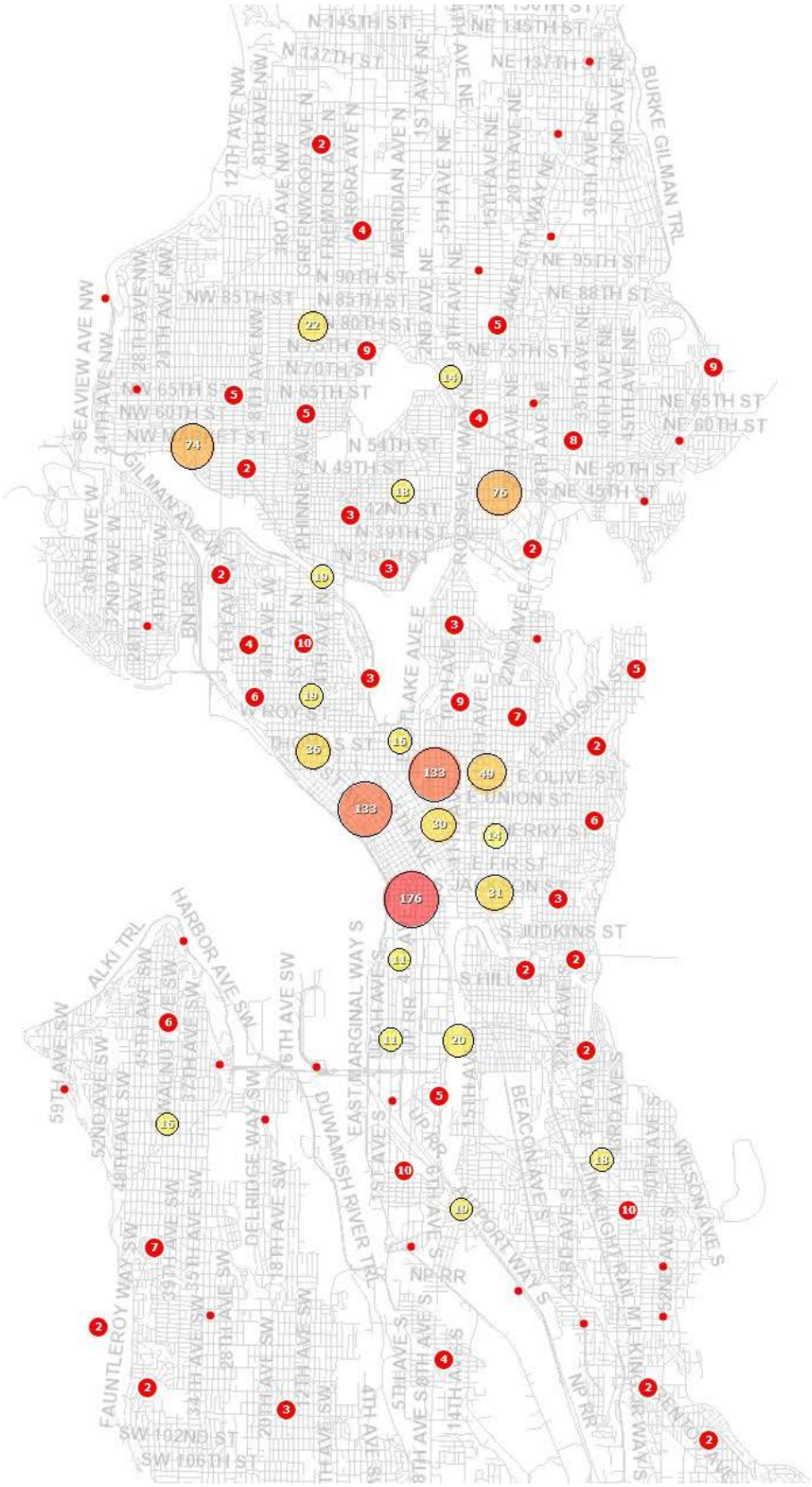
### 2.1.1 Citywide maps showing URM locations

The following maps show the locations of the URMs throughout the city. The first map shows a small dot for each building while the second map shows a cluster diagram to show how many URMs are in each area. The third map, Figure 3, shows the locations of the URMs with respect to the new council districts.

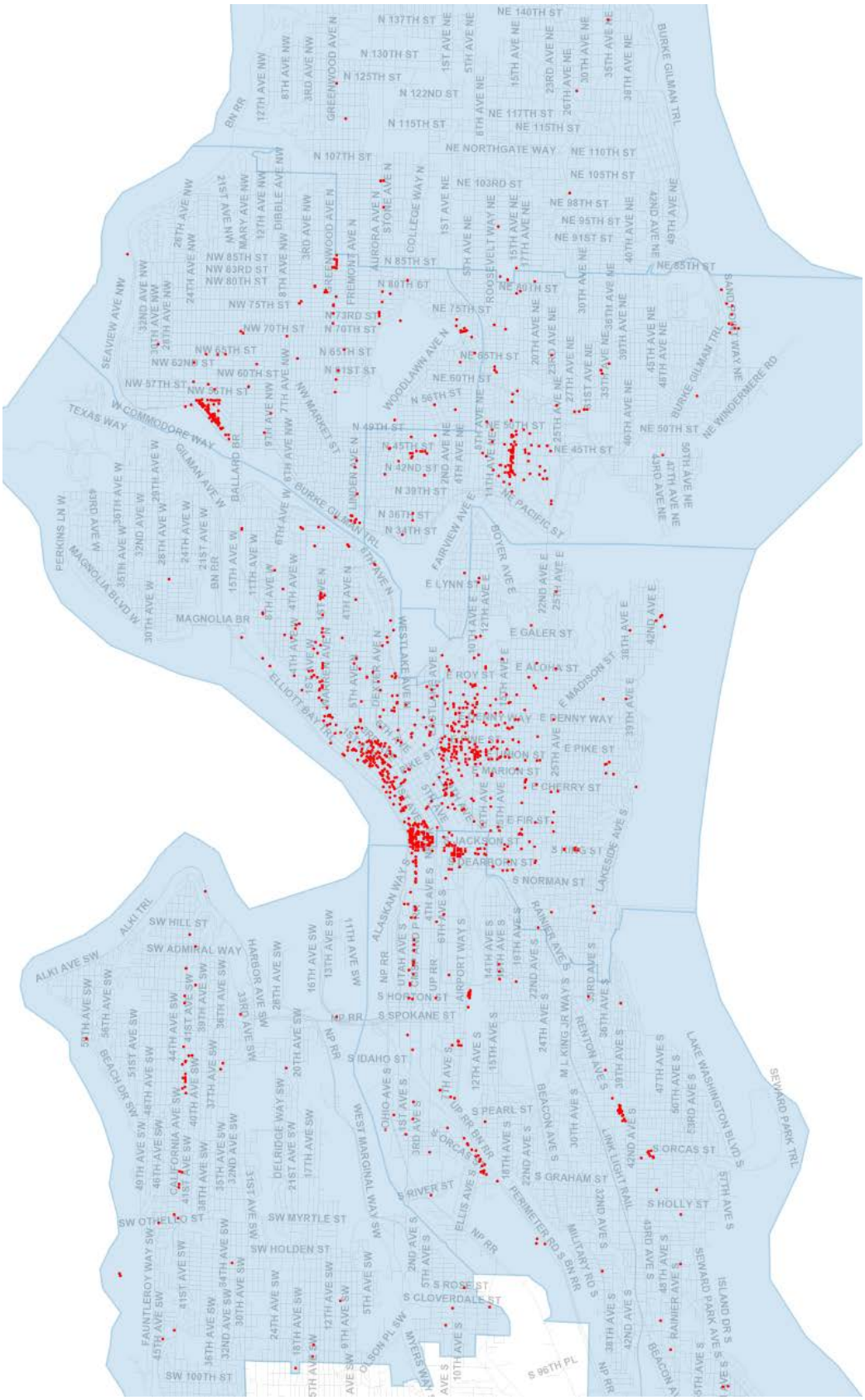
## Figure 1 Locations of URMs in Seattle



## Figure 2 Cluster Diagram of URM Locations in Seattle

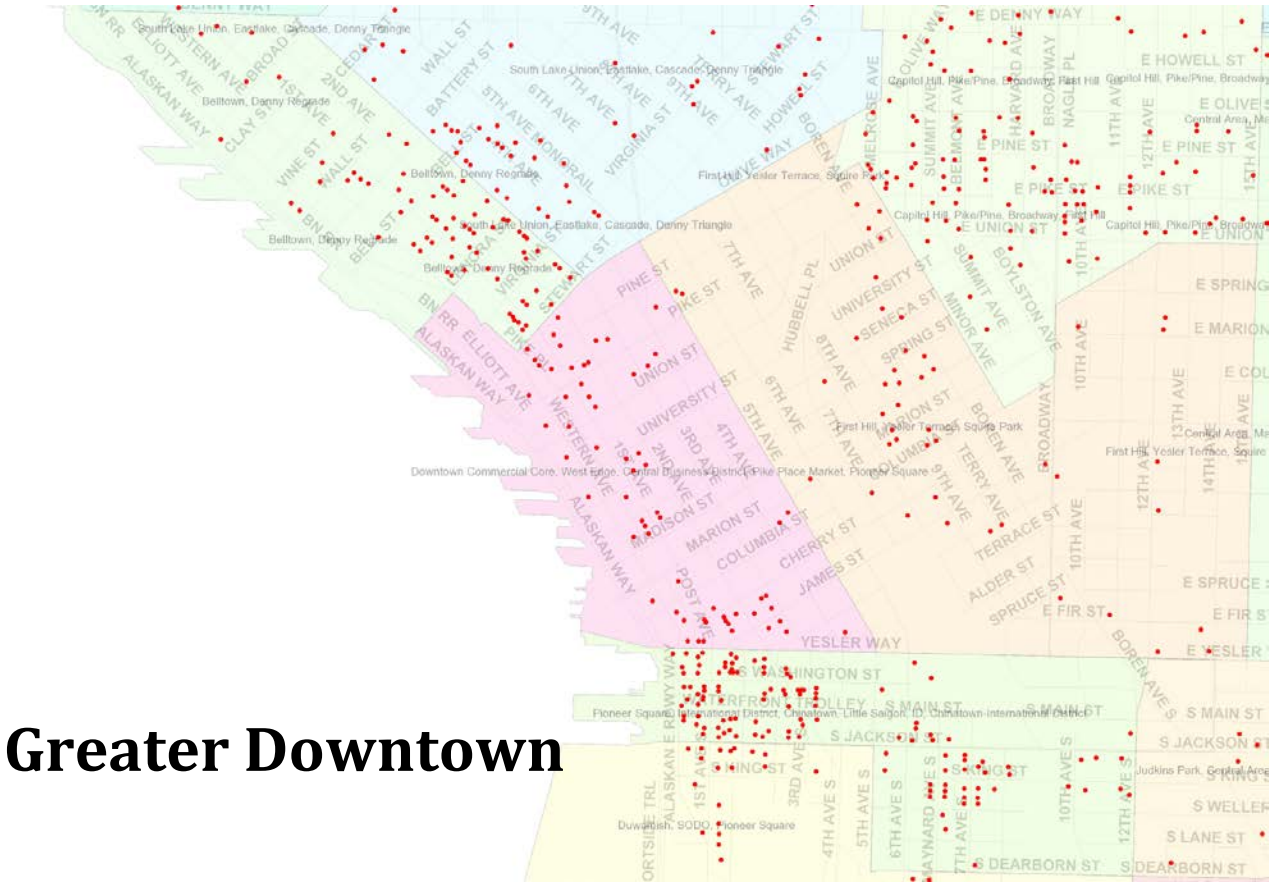


## Figure 3 URM Locations and City Council Districts



### 2.1.2 Map of Greater Downtown Area

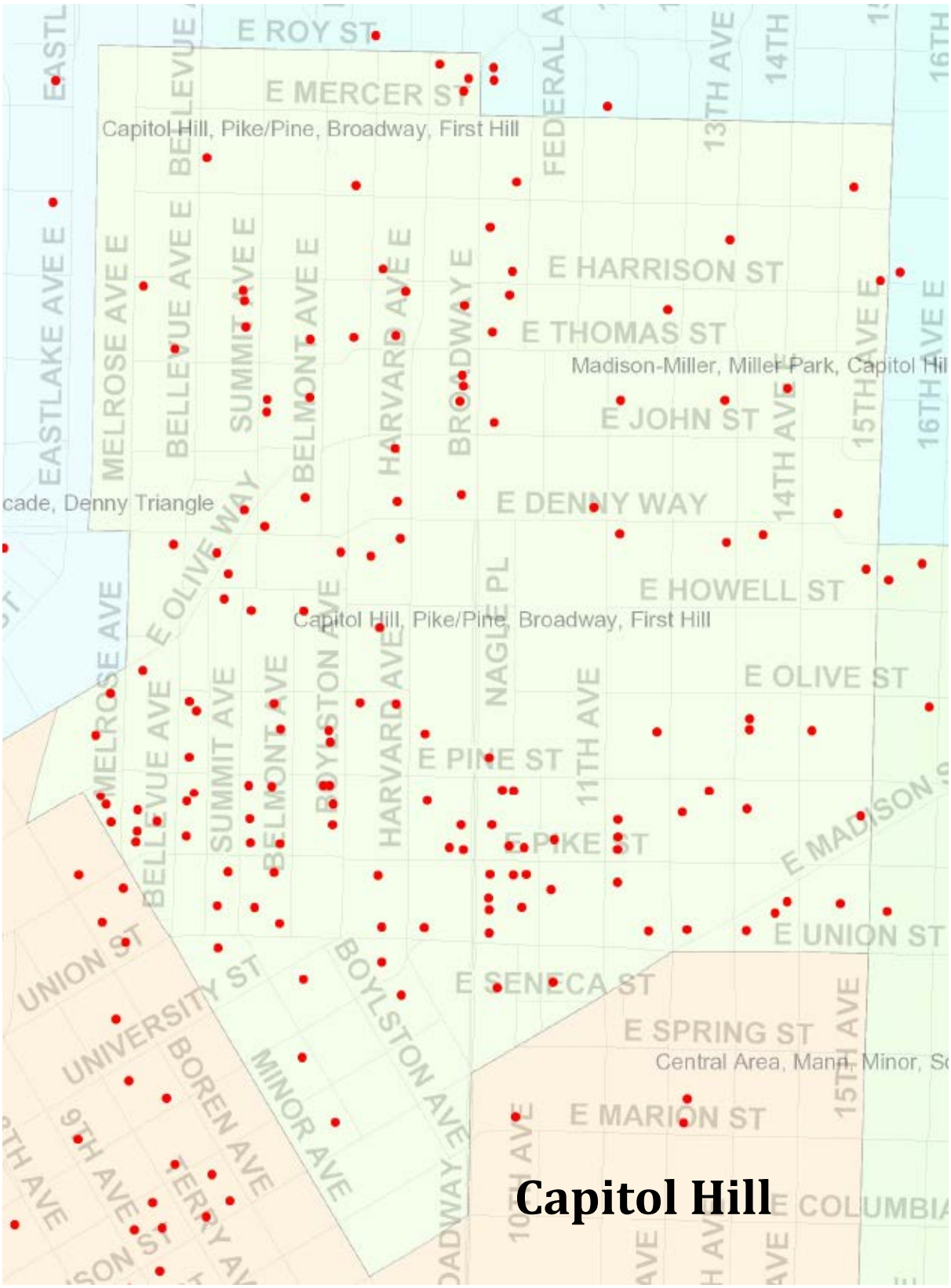
**Figure 4 Locations of URMs in Greater Downtown Area**



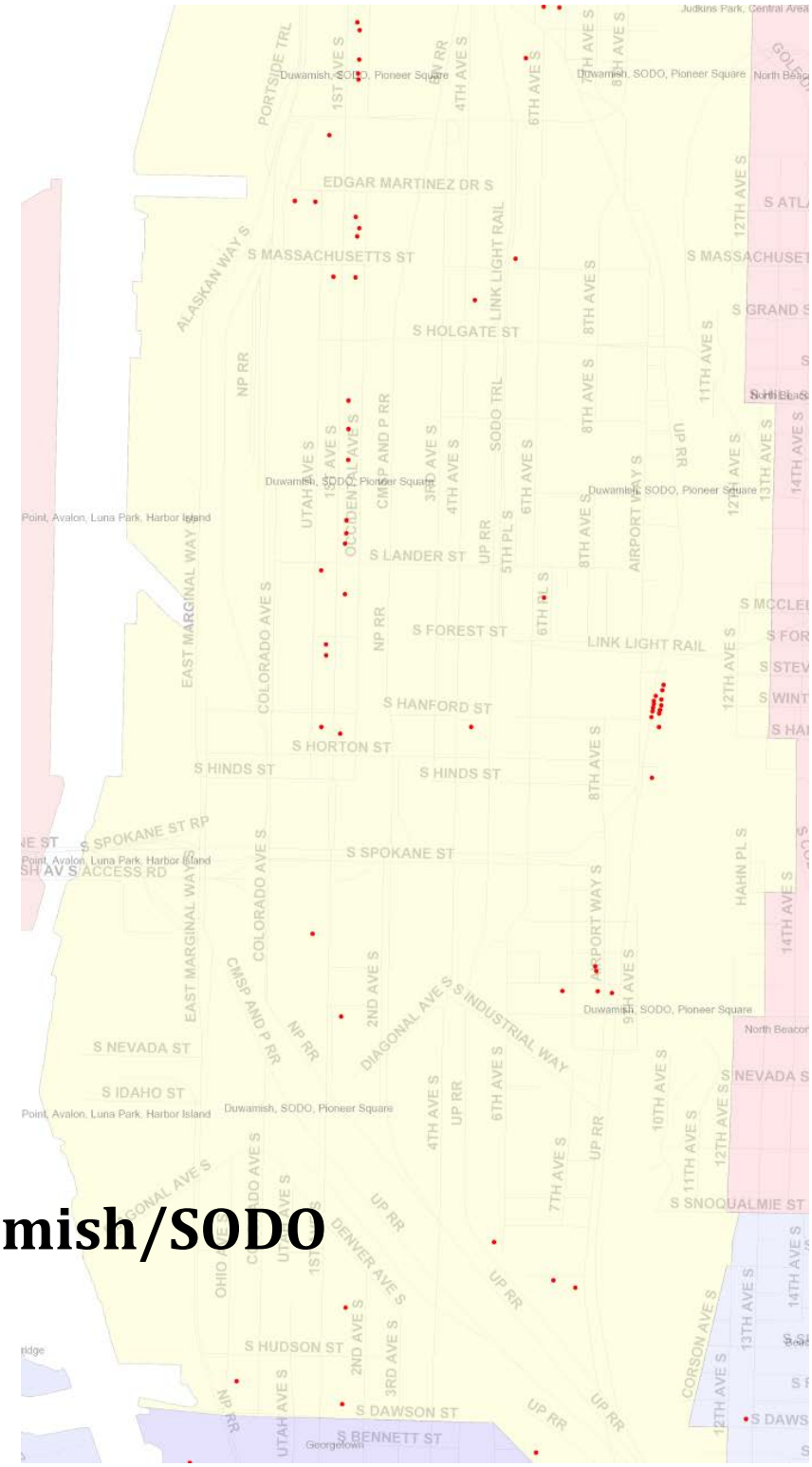

Greater downtown includes Belltown, Downtown, the southern portion of Cascade/Eastlake, First Hill, Pioneer Square, Chinatown/International District, and the northern portion of Duwamish/SODO

### 2.1.3 Maps of Other Neighborhoods

**Figure 5 Locations of URMs in Capitol Hill**



### Figure 6 Locations of URMs in Duwamish/SODO




For the northern section of Duwamish/SODO, see Figure 4 Locations of URMs in Greater Downtown Area .

**Figure 7Locations of URMs in Queen Anne**

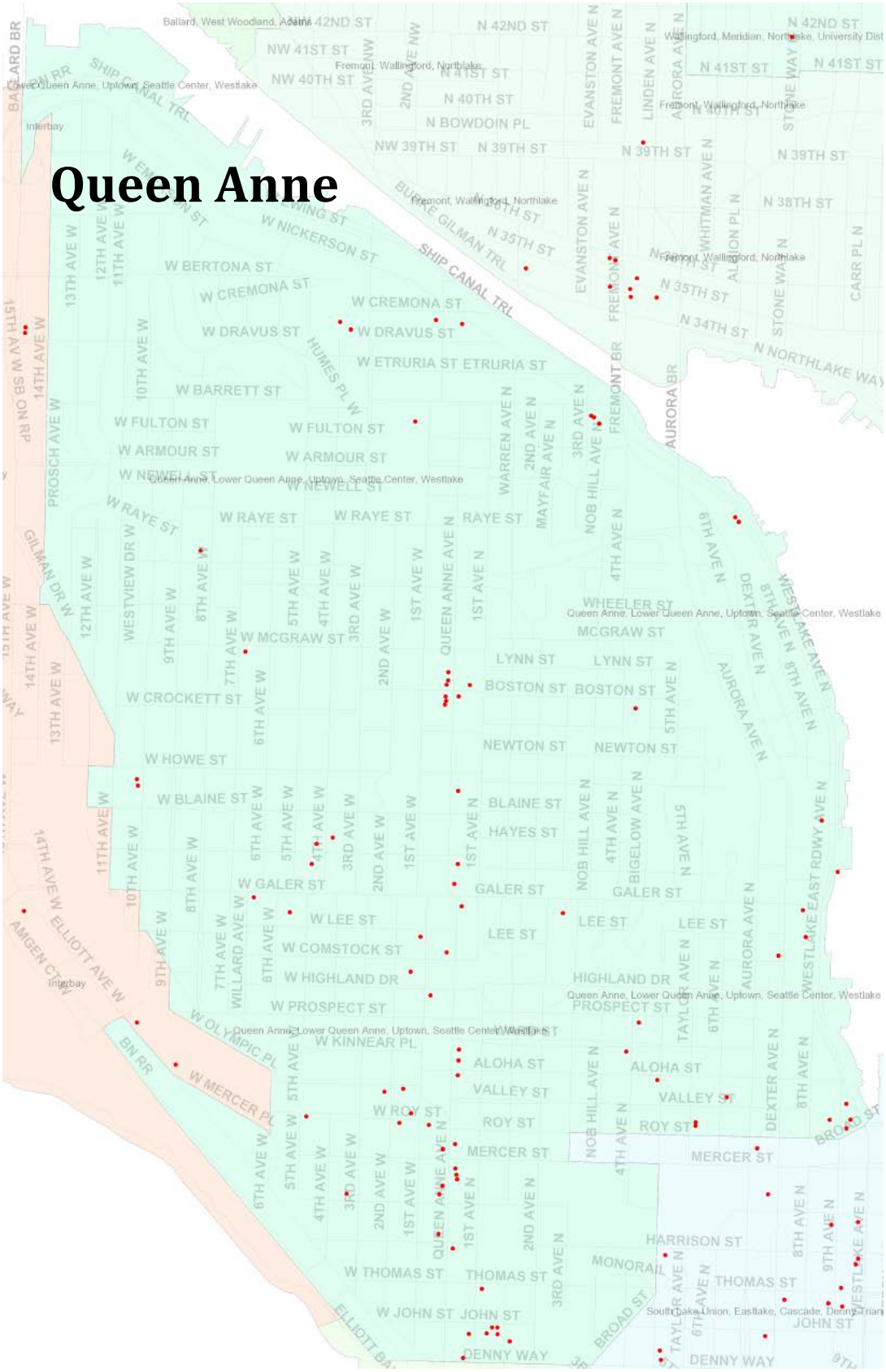


**Figure 8 Locations of URMs in the University District**

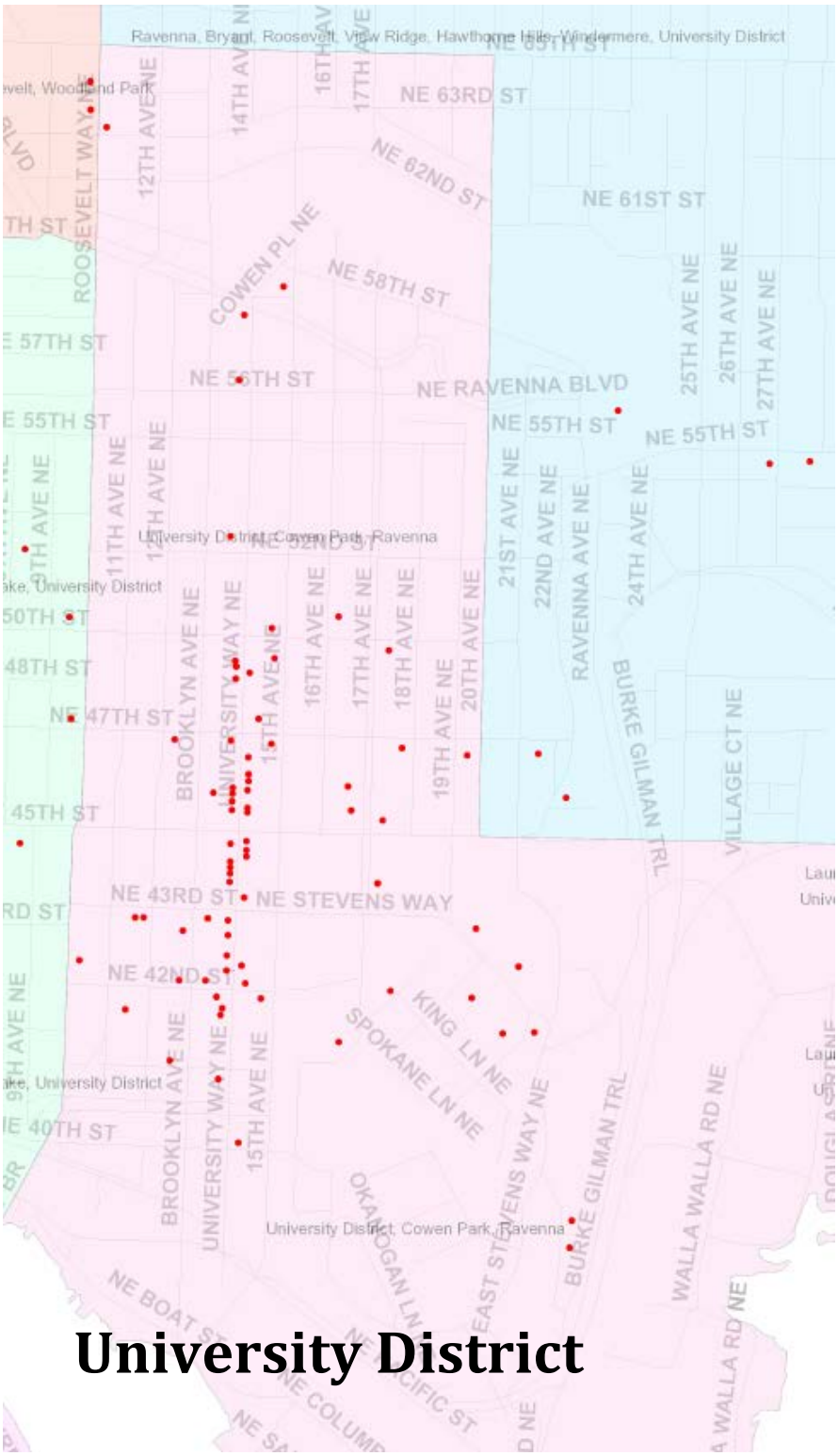
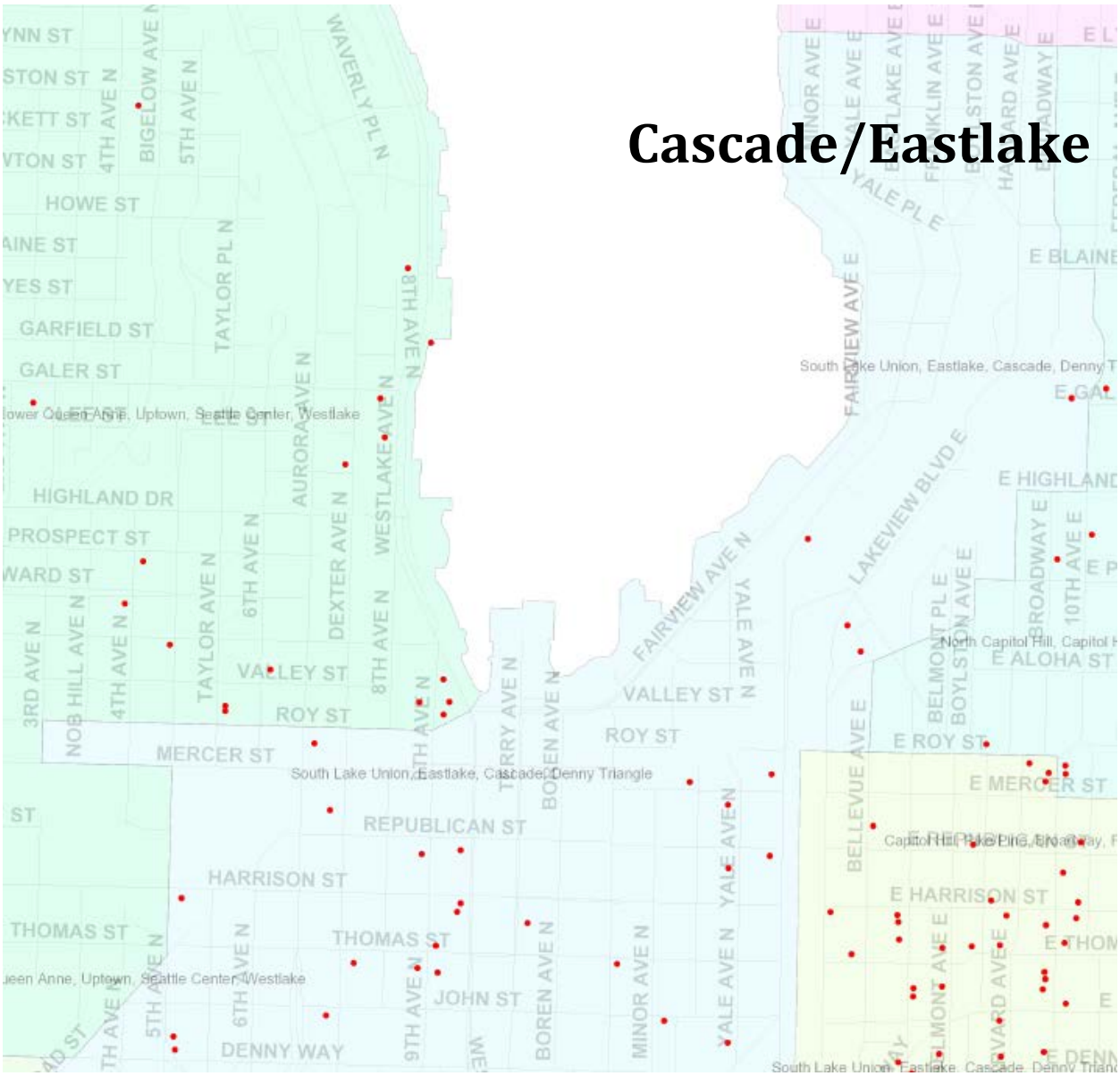


**Figure 9 Locations of URMs in Cascade/Eastlake**




For southern portion of Cascade/Eastlake, see Figure 4 Locations of URMs in Greater Downtown Area .

**Figure 10 Location of URMs in Ballard**

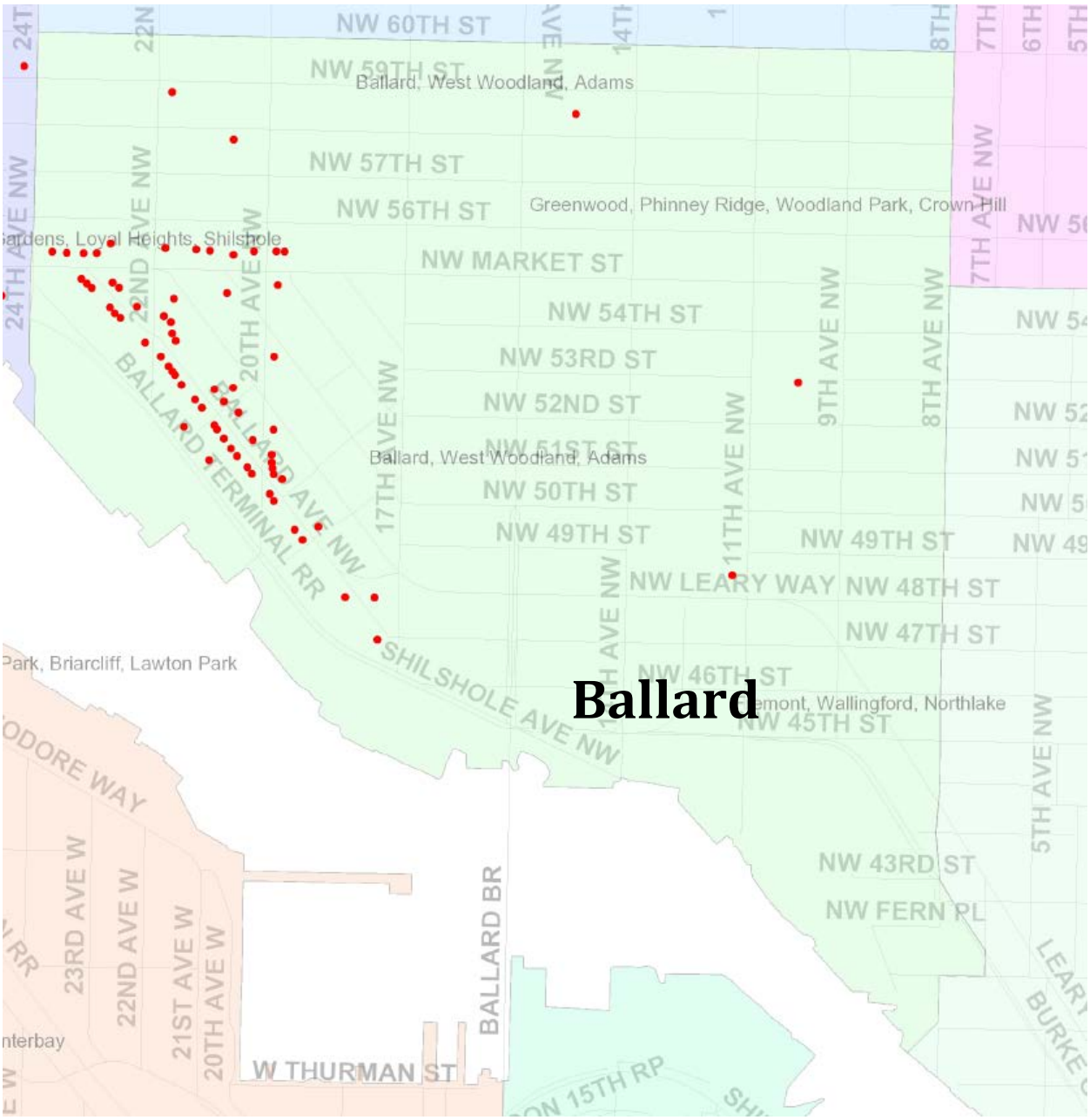
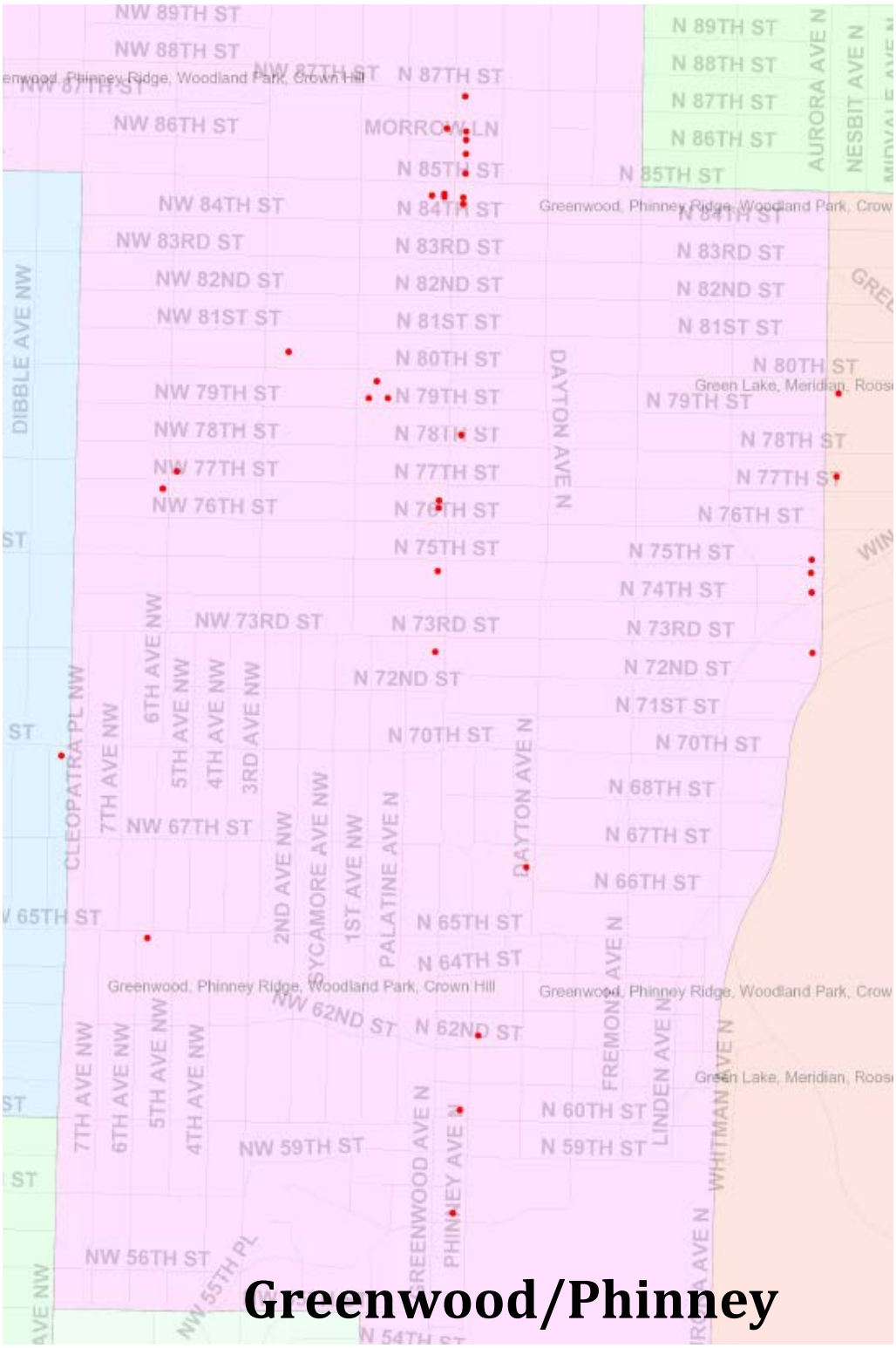
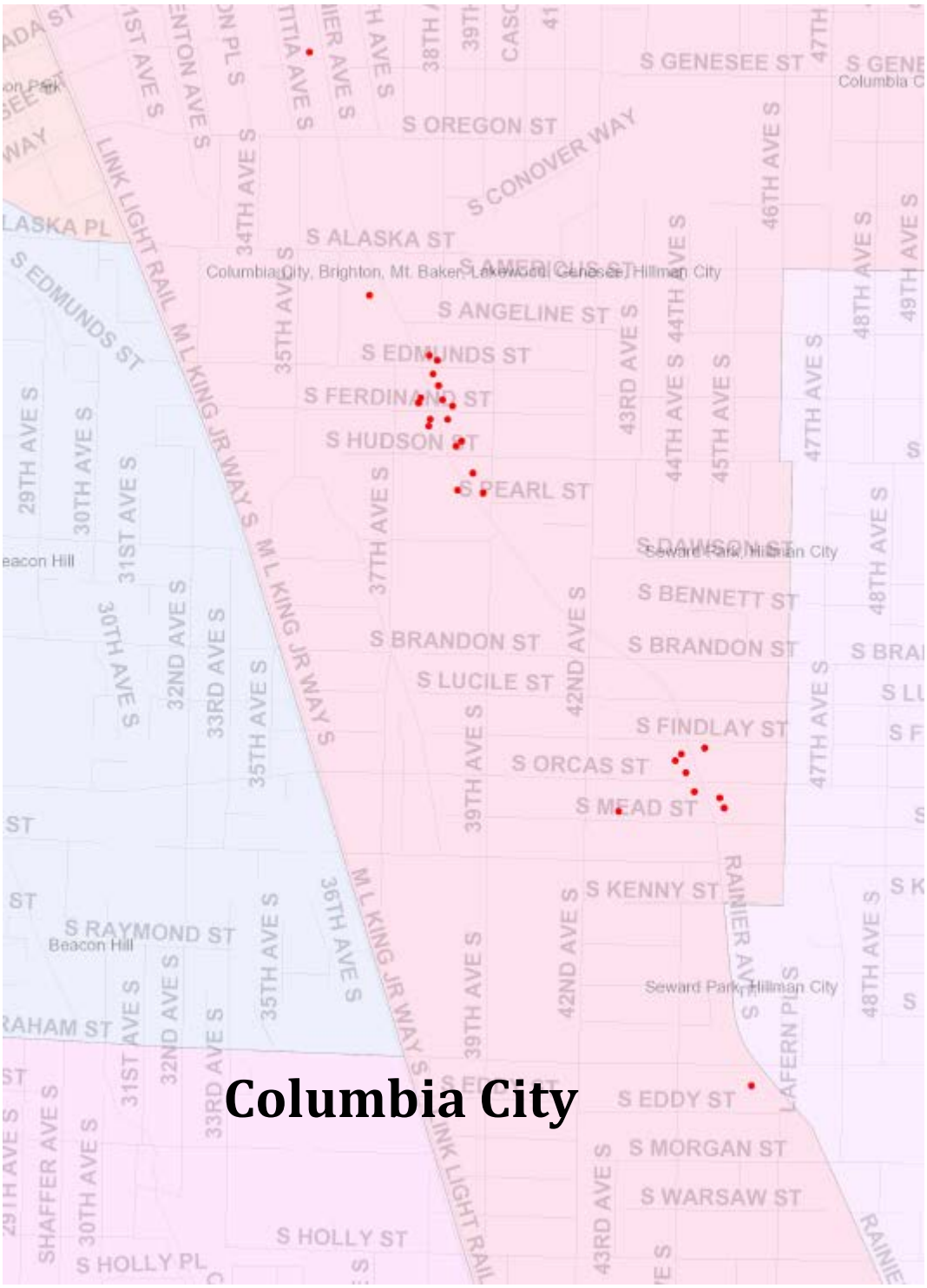


**Figure 11 Locations of URMs in Greenwood/Phinney**



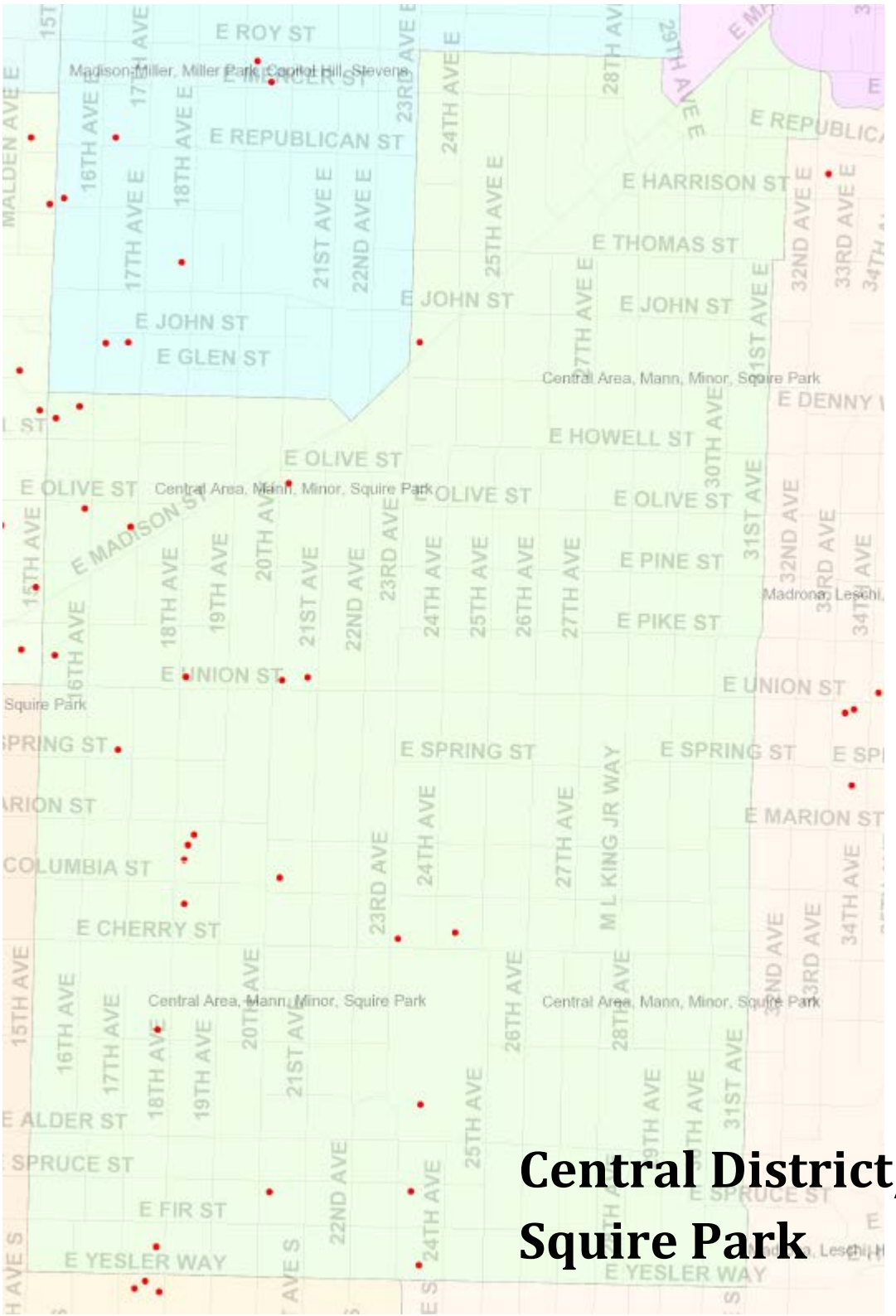

The portion of the neighborhood not shown on the map does not contain any known URMs.

**Figure 12 Locations of URMs in Columbia City**

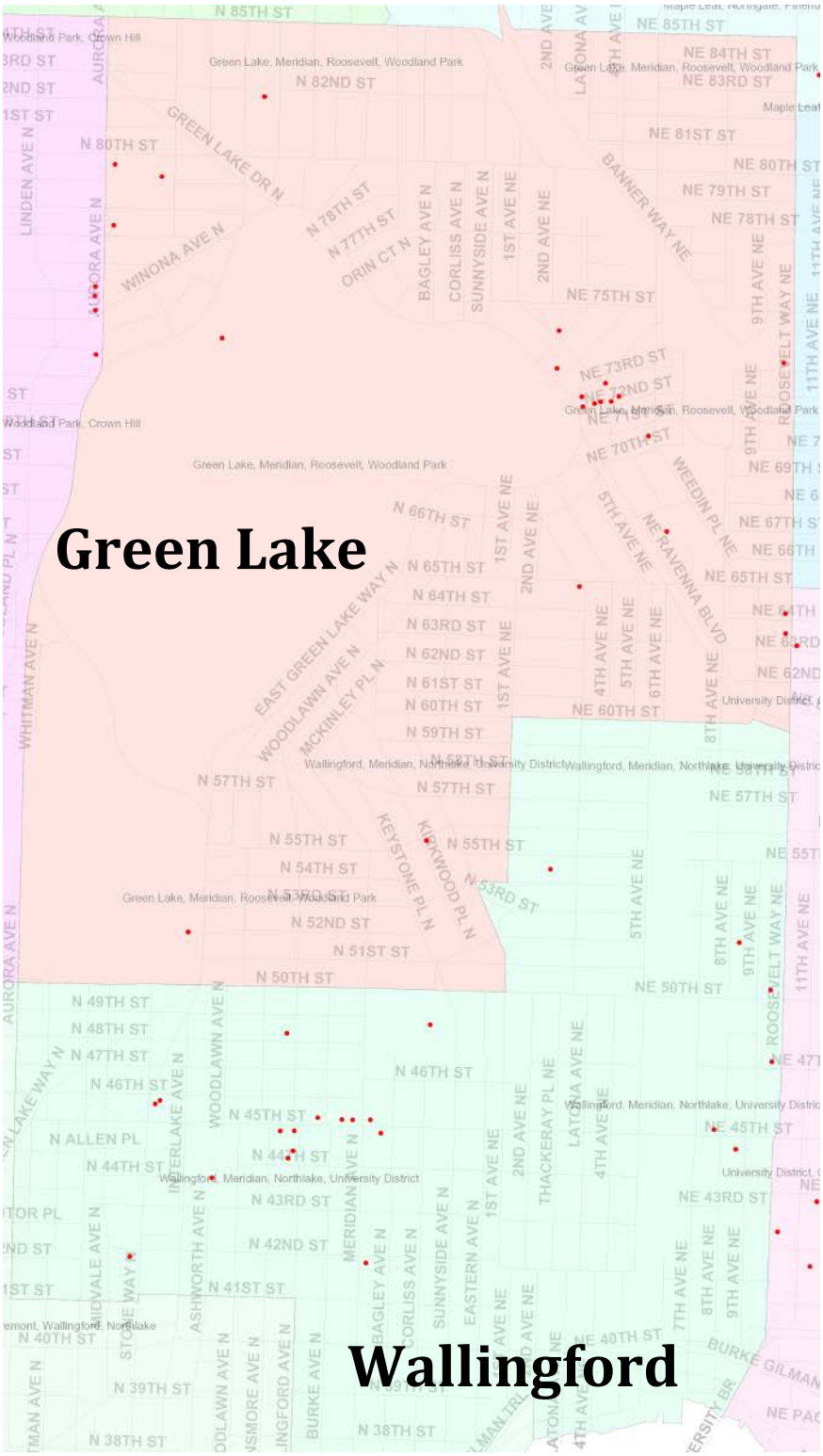



The portion of the neighborhood not shown on the map does not contain any known URMs.

**Figure 13 Locations of URMs in Central District/Squire Park**



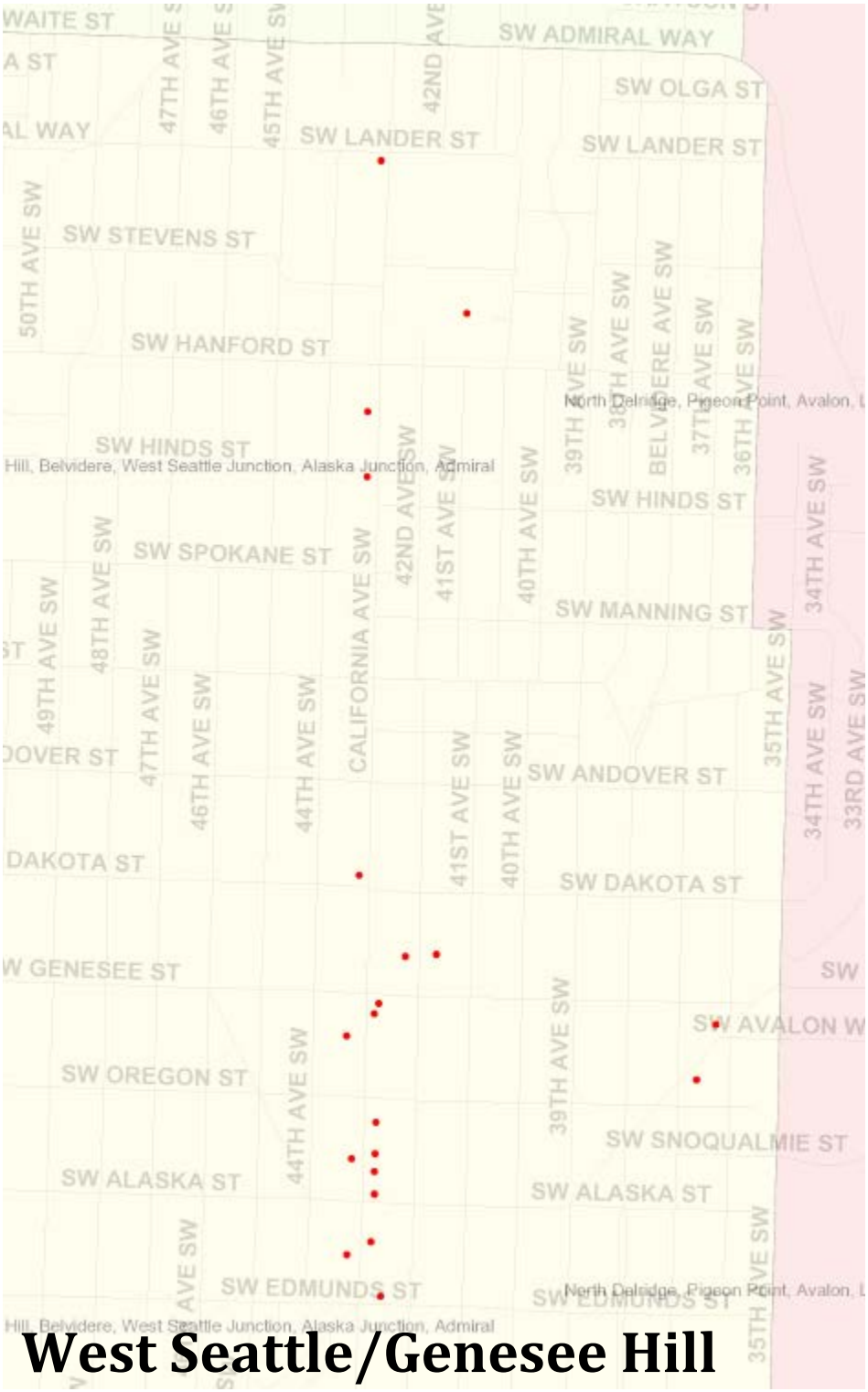
### Figure 14 Locations of URMs in Green Lake and Wallingford




The portion of the neighborhood not shown on the map does not contain any known URMs.

**Figure 15 Locations of URMs in Georgetown**

**Figure 16 Locations of URMs in West Seattle**



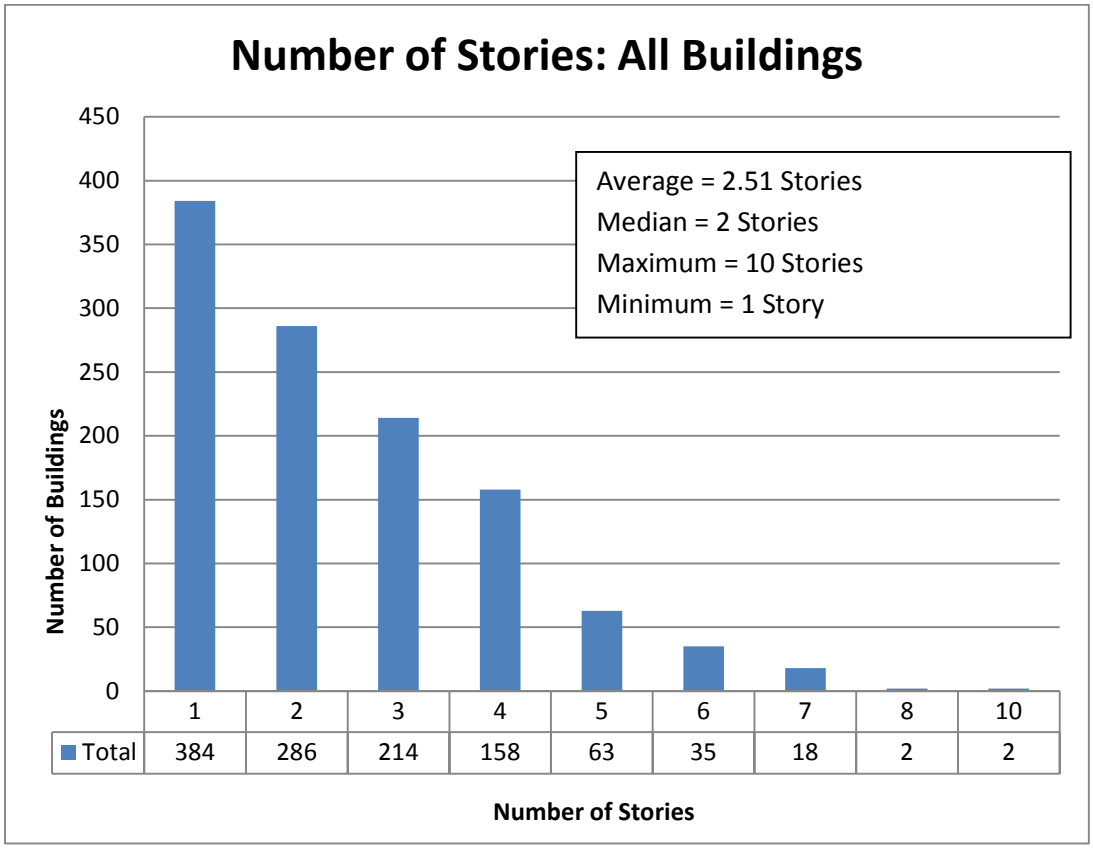

The portion of the neighborhood not shown on the map does not contain any known URMs.

## 2.2 Size of Buildings

### 2.2.1 Stories

The URM building stock is predominantly low rise. Seventy-six percent of the buildings are three stories or less, with nearly 90 percent four stories and less. The average building height is 2.44 stories and the maximum is 10 stories. For additional charts showing different usage groups, see section 2.2.1.1.

**Figure 17 Number of Stories of All Buildings**




#### *2.2.1.1 Number of Stories for Different Usage Groups*

Residential buildings tend to be the tallest building group with an average of 3.7 stories and a median of 4 stories. Buildings with just commercial occupancy are the shortest group with a median height of 1 story. The other usage groups all have a median height of 2 stories with the exception of schools which have a median height of 3 stories.

**Figure 18 Number of Stories: Residential**

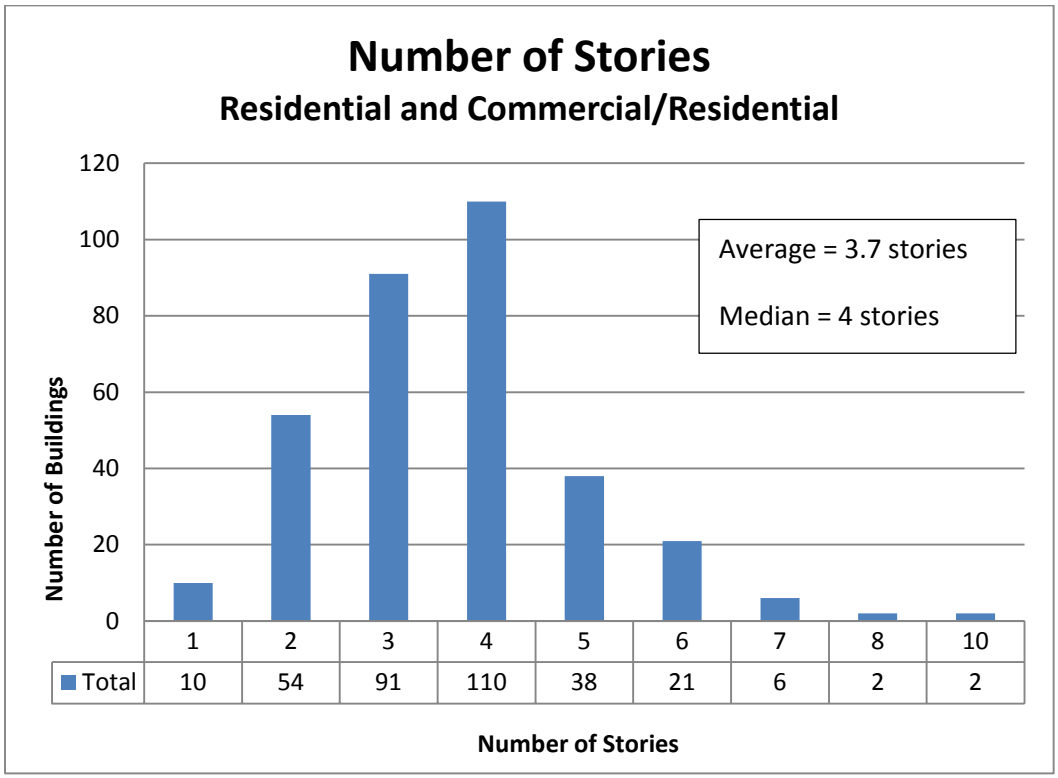



**Figure 19 Number of Stories: Commercial**

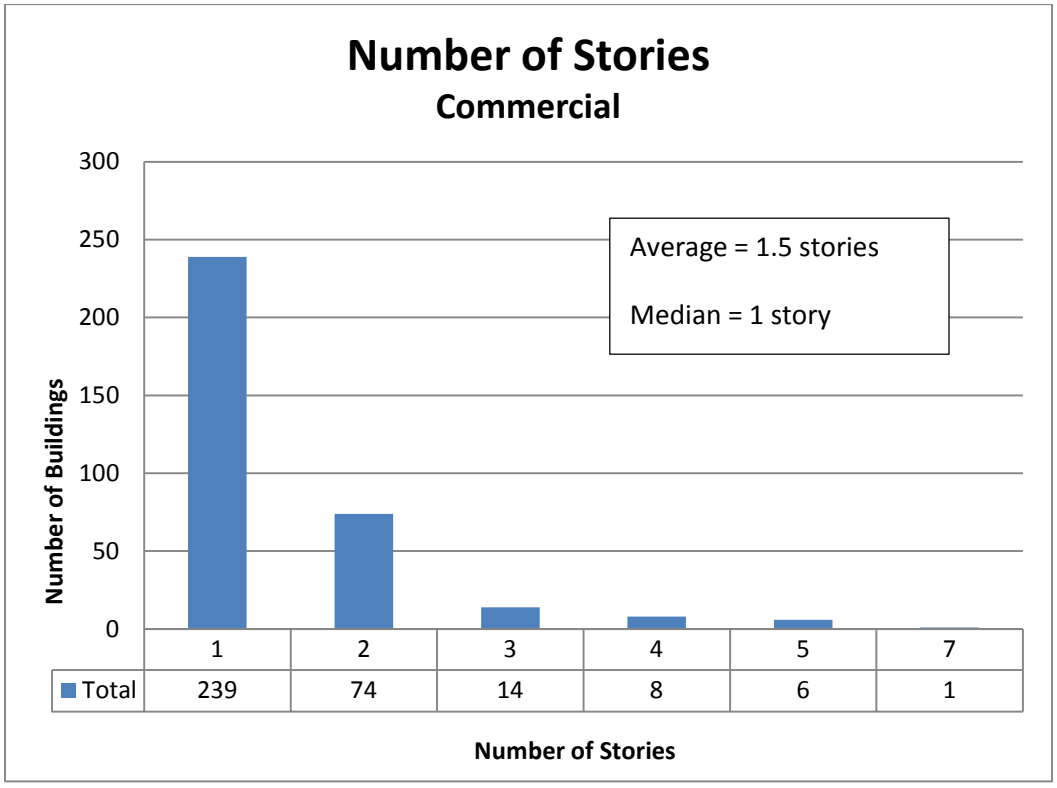


**Figure 20 Number of Stories: Schools**

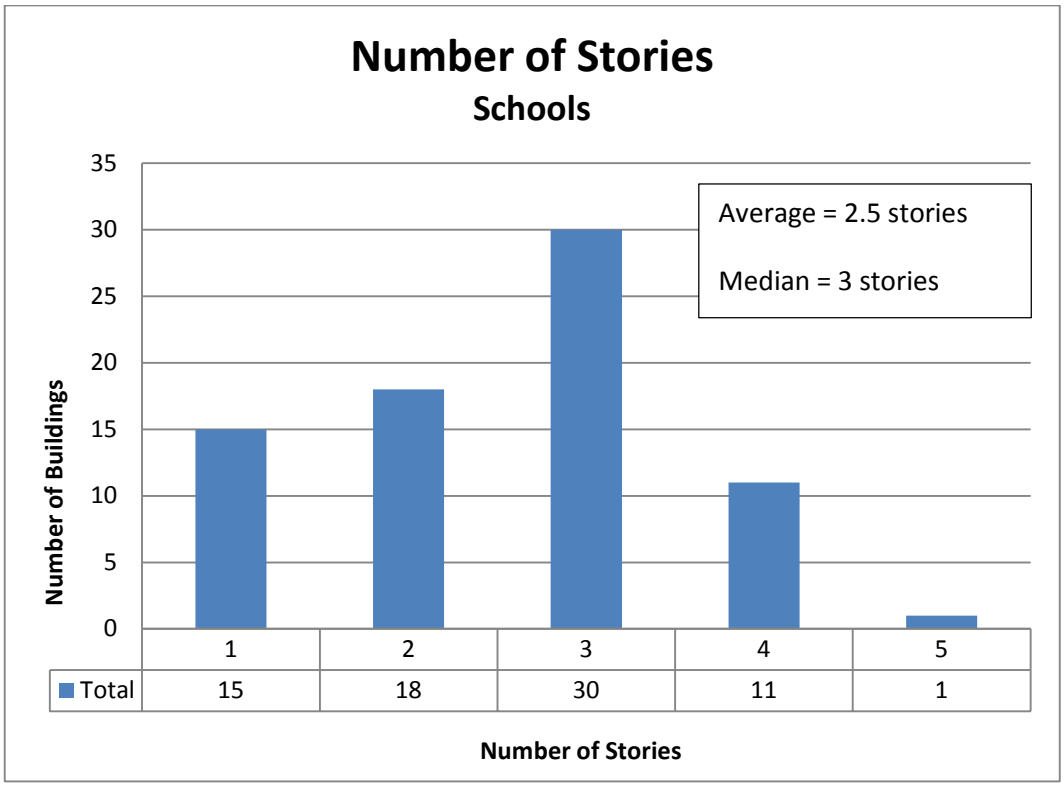



**Figure 21 Number of Stories: Public Assembly**

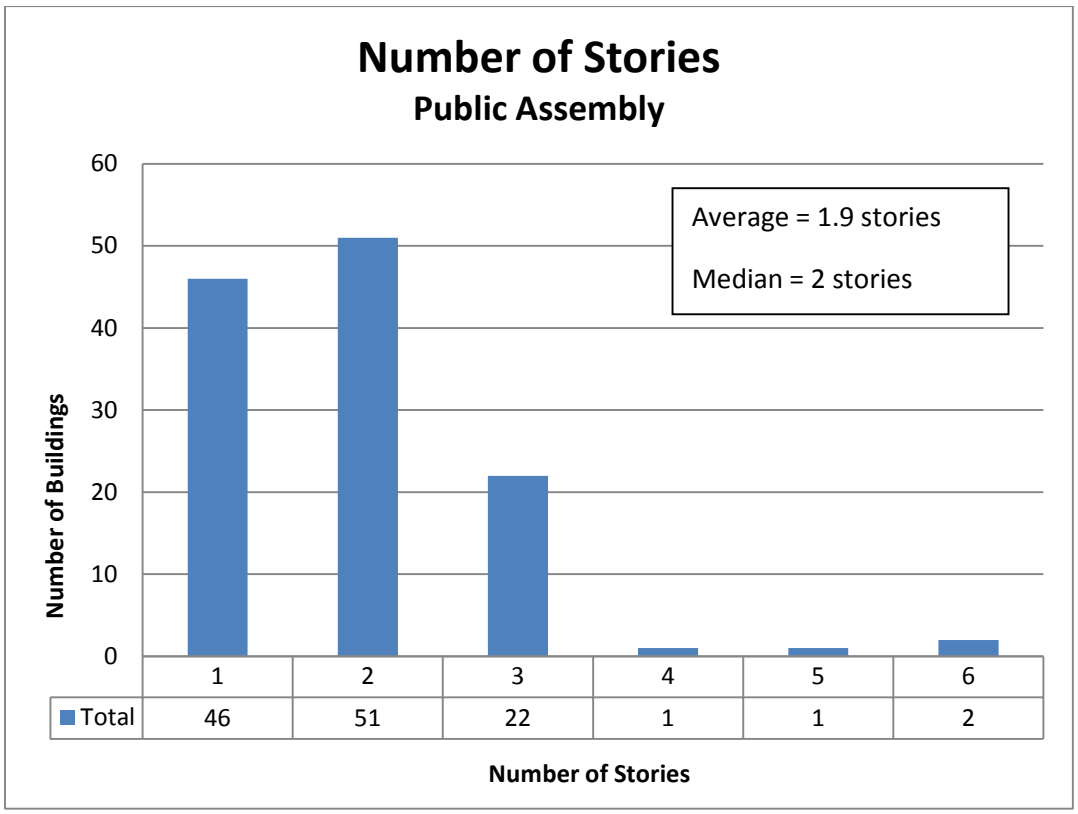


**Figure 22 Number of Stories: Office**

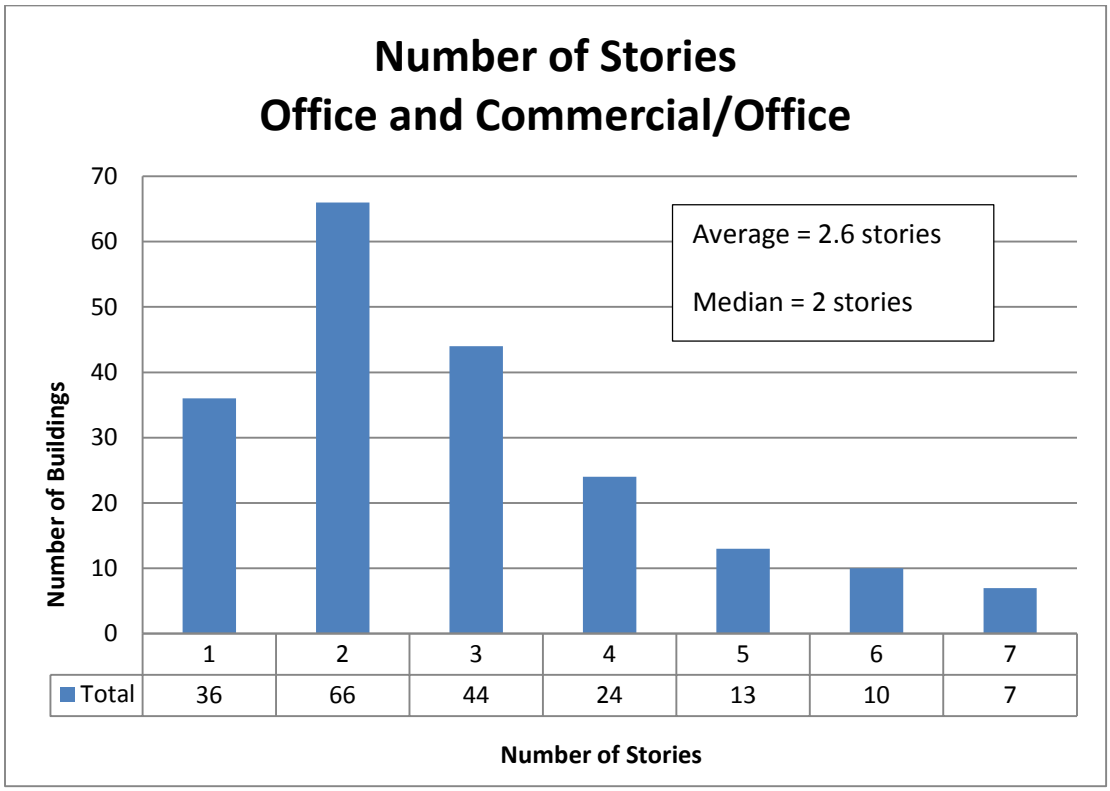
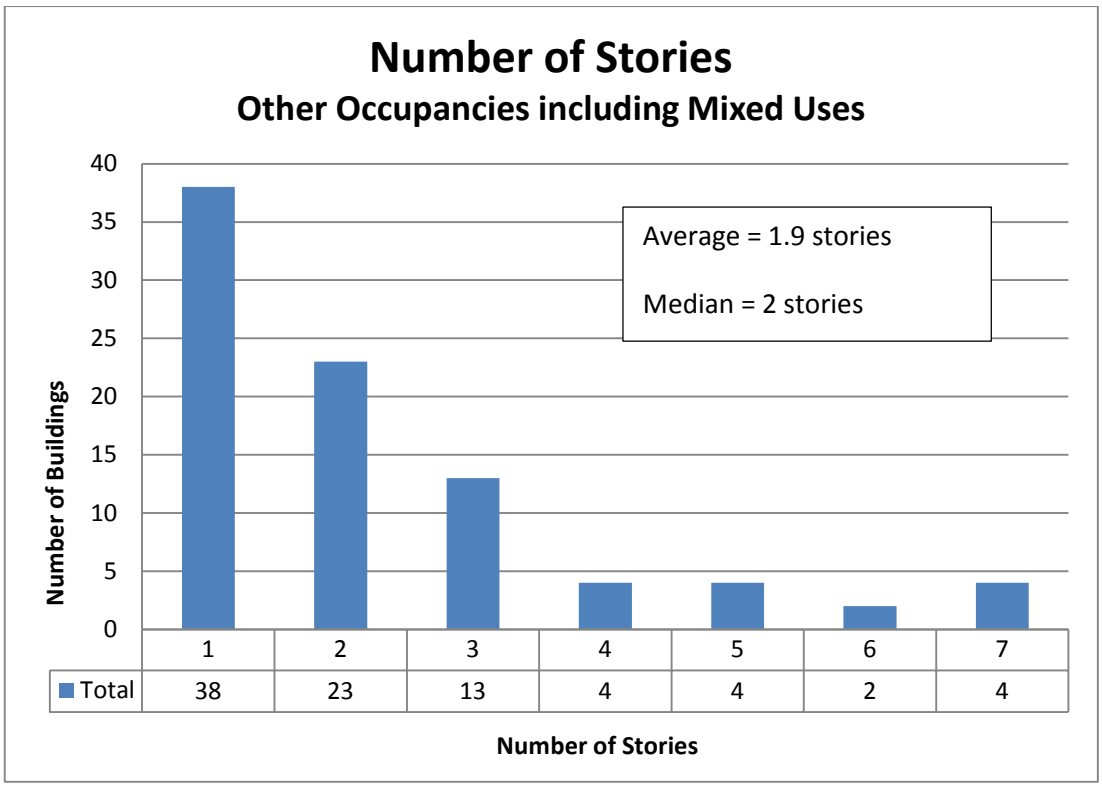



**Figure 23 Number of Stories: Other including Mixed Uses**



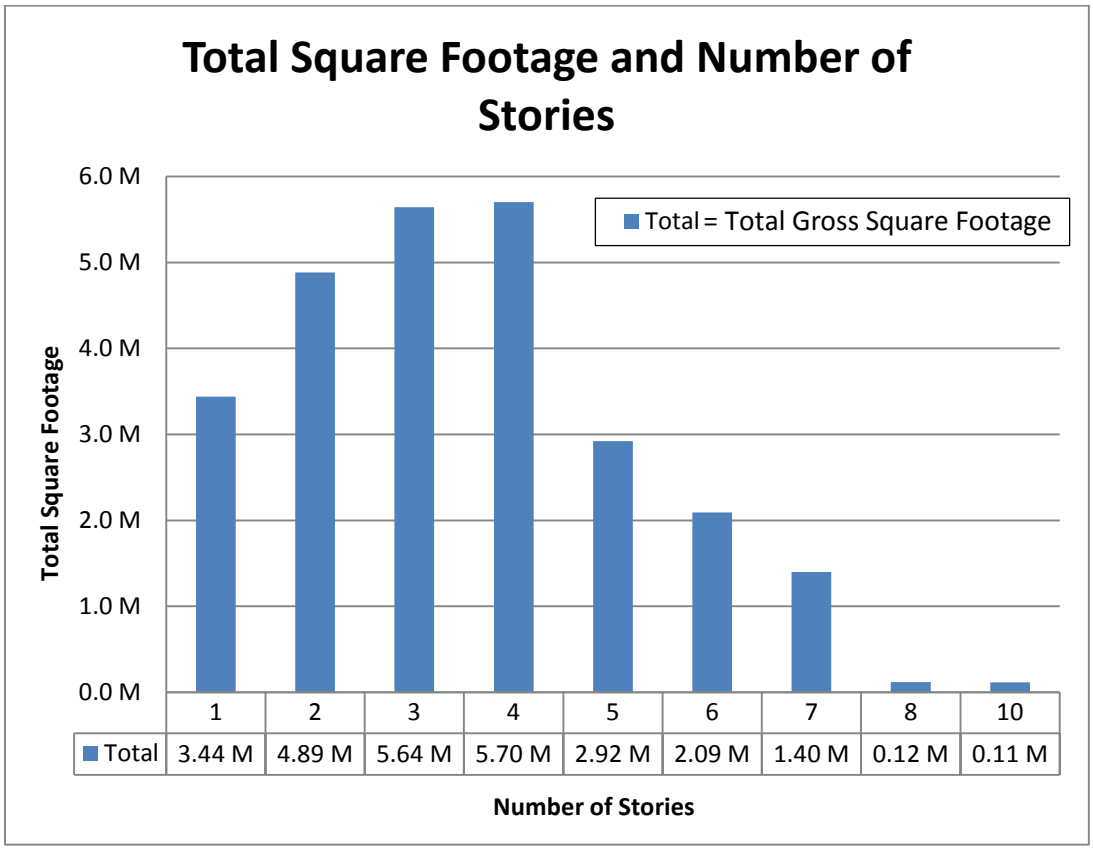
### 2.2.2 Square Footage

There are an estimated 26.3 million square feet of URM buildings in Seattle. Thus, the approximate average size is roughly 23,000 square feet. Table 3 lists the average gross square foot area for each of the different building heights. The accompanying chart in Figure 24 shows the total square footage of each height of building.

Table 2 Average Square Footage by Story

| Stories | Average Gross Square Foot Area |
|---|---|
| 1 | 9015 |
| 2 | 17607 |
| 3 | 26874 |
| 4 | 37264 |
| 5 | 46369 |
| 6 | 59806 |
| 7 | 82405 |
| 8 | 59860 |
| 10 | 56771 |

**Figure 24 Total Square Footage by Story**



# 3 2015 URM List Validation Process

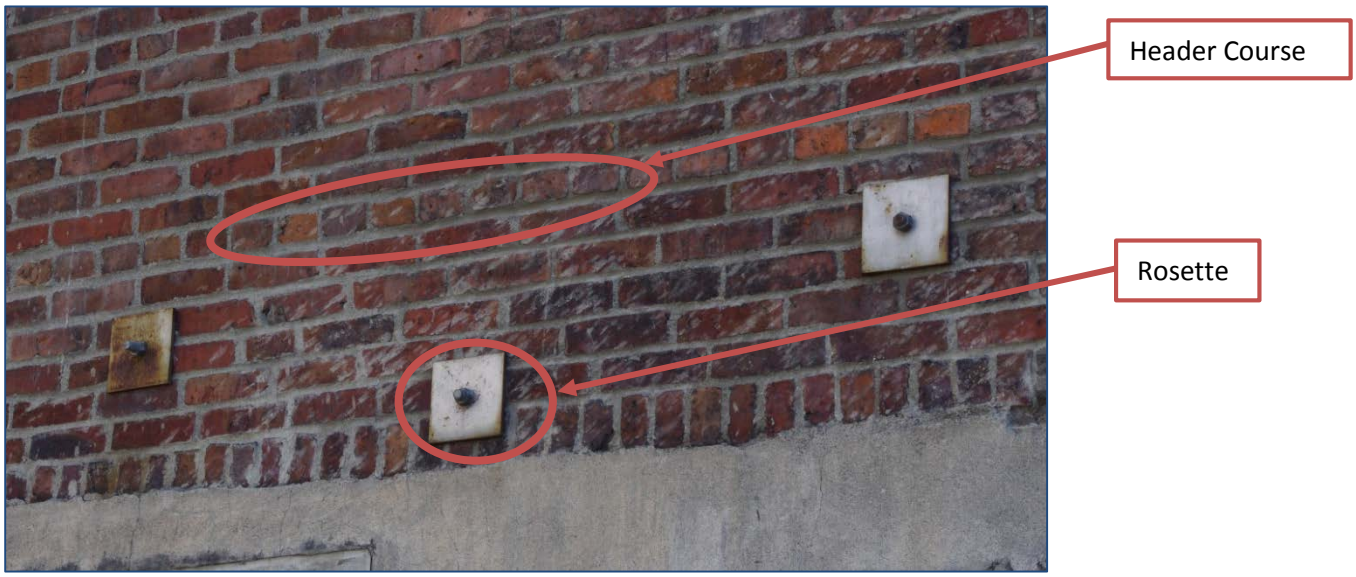
The first task of the validation process was to combine all the previously acquired data. After all the lists had been combined, duplicates were identified and consolidated. Additional buildings were located and validated during the process; buildings determined not to have URM bearing walls were removed from the list.

## 3.1 Validation Criteria

The basic premise of the work was to validate that each building on the list is, or is strongly suspected of being, a URM. The first step of the validation process was to observe the exterior of each building to see if there were header courses in the brick pattern. If there were header courses then the building stayed on the list. In addition, if the building had rosettes at the floors and/or roof level, it was kept on the list. (See Figure 25 for a visual representation of header courses and rosettes.) If header courses or rosettes were not visible, then the plans were reviewed to determine if the construction type could be identified. If the building was still not confirmed, the "white cards" (the earliest permit records) were reviewed to determine if the building construction type was identified. Finally, the Sandborn Insurance Maps, available in the Seattle Room at the Central Seattle Public Library, were reviewed for the whole city.

A small number of additional URMs may not have been identified in this study. Buildings where the URM indicators or elements were not visible from areas accessible to the public, or that do not appear in the other resources Seattle DCI consulted could not be included on the list.

**Figure 25 Header Course and Rosette Example**




### 3.1.1 Maps

The locations of all the identified URMs were plotted on a GeoCortex (GIS) map. This gave the ability to identify duplicate entries in the database. The maps were also used to scan for larger buildings located in single family zones. These buildings were then checked to see if they were URMs.

Google Streetview was used extensively to validate the URM list. Many of the buildings on the list could be validated by viewing the street or alley sides of the building on Google Streetview. The "See Inside" photos available on Google Streetview were also useful in some cases for viewing the sidewalls of buildings built adjacent to other buildings.

Using the GIS map data, all the public and private schools and churches were isolated for review. After these buildings were identified, they were validated by Google Streetview, field visit, white cards, or the Sandborn Insurance Maps.

### 3.1.2 Sandborn Insurance Maps

The Sandborn Insurance Maps were produced for the fire insurance industry from about 1870 through the 1950s. The map volumes are large-scale detailed maps (1"=50') showing building construction and fire hazard information. The color-coding of the atlas provides a simple way to identify buildings of a particular type. All of the pages of the Sandborn Insurance Map atlases were scanned for masonry building. These buildings were then reviewed through Google Streetview or field visits.

### 3.1.3 Field Work

For buildings that could not be validated using Google Streetview, walking tours were undertaken for many neighborhoods. The focus of these tours was to validate specific buildings and not to canvas the neighborhoods for additional URMs. However, in the course of walking around the neighborhoods, many additional URMs were identified owing to the clustered nature of the buildings. An attempt was made to view all four sides of each building. This was not always possible due to access restrictions.

### 3.1.4 White Cards

The white cards are the oldest permit records maintained by the Seattle Department of Construction and Inspections. They contain descriptions about building permits issue by the department from the earliest days of the twentieth century until the early 1980's. The information about each permit includes the date, the permit number, the estimated construction cost, a brief project description, the type of construction, and the building occupancy. When other sources were unavailable to confirm the presence of URM construction, the white card data were used to validate the building. "Ordinary Masonry" or OM construction was considered to mean the building was a URM.

### 3.1.5 Office of Housing

The City of Seattle Office of Housing provided a list of the buildings that they have funded. This list was cross-referenced with the URM list to determine one measure of the number of affordable housing units located in URMs.

### 3.1.6 Preservation Preparedness Report

In 2011 a group from the University of Washington, with funding provided by King Country 4Culture, produced a report aimed at further identifying URM buildings in Seattle with an interest in upgrading them to preserve the historic character of the city. While the specific definition of a URM used in the report is different from the definition used for the proposed retrofit ordinance, there was a great deal of useful information in the report. The maps in the report and on the report website were useful in identifying URMs that had been overlooked in previous studies.

### 3.1.7 University of Washington

The University of Washington Facilities Office provided a list of the buildings at the University of Washington that contain at least one URM bearing wall. These building were not verified further.

## 3.2 Buildings Removed from the URM List

310 buildings were flagged for removal from the list for the following reasons.

### 3.2.1 Demolition

During the recent building boom, many URMs have been demolished to make way for new projects. 61 buildings on the URM list have been demolished since they were listed. A building was considered to be demolished even if the façade remained and was tied into a new building.

### 3.2.2 Duplicates

Due to addressing issues, there were 90 duplicate buildings on the list.

### 3.2.3 Not Unreinforced Masonry Bearing Wall Buildings

Buildings were removed from the list after either a site review or review of permit drawings if they were found not to have URM bearing walls. Most often, these buildings were brick veneer over either wood or concrete framing.

#### *3.2.3.1 Site Visit*

During the fieldwork, some buildings were flagged for removal from the URM list. Some of the visual cues that were used to determine that a building should not be on the URM list were: single layer brick veneer on only one face, board form concrete, and concrete frame with URM infill.

#### *3.2.3.2 Permit Drawing Review*

If a building could not be clearly identified as URM through a visual exterior observation, then the Seattle DCI records were searched for permit drawings. If there was adequate information in the permit drawings that showed the building to be a construction other than URM, then it was tagged for removal from the list.

## 3.3 King County Assessor's Records

The King County Assessor's records were used to obtain the gross building square footages. In a few cases, the building square footage was estimated either from the plan dimensions of the building in GIS or from permit records.

It was discovered that it was very difficult to tell what the building occupancy was based on a visual observation. The KCA data shows the building uses, and these were generally used to assign the occupancy category. When the permit records showed significantly different information, that data was used instead.

The occupant load (see section 5.3 for a description of occupant load) of residential buildings were generally estimated using the KCA data for the number of units in the building. Buildings with under about 500 square feet per unit were estimated with one occupant per unit. Larger units were estimated with 1.5 people per unit.

## 3.4 Retrofit Status

The permit records for each of the buildings on the URM list were reviewed to determine if the building has had a permitted retrofit. The project descriptions in the permit records for the last twenty or so years are generally clear, but those before the mid-1990s are less descriptive. The data is divided into four categories of retrofit status described below.

***Substantial alteration*** is a Seattle Existing Building Code process used when the building is undergoing a significant renovation, change in use, or re-occupancy after being vacant. For URMs the seismic force resisting system is upgraded to address deficiencies identified in a seismic report. Seattle DCI and the building design team negotiate to address the deficiencies that will gain the largest reasonable increase in the seismic safety of the buildings. In all cases, the most significant life safety risks are addressed. The locations of the buildings that have been substantially altered are shown on the map in Figure 26.

***Permitted retrofit*** is a category that encompasses everything from the building that has only had its parapets braced to a building that has had a complete voluntary retrofit that addresses most of the deficiencies in the system resulting in a building that exceeds the requirements of the proposed Technical Standard.

***Visible retrofits*** are those for which a permit record could not be located, but there is external evidence that seismic strengthening work has been done. For most of these buildings, this is the tying of the floors and roof to the unreinforced masonry walls and parapet bracing.

***No visible retrofits*** are buildings for which no permit records have been found for seismic retrofits. It is possible that some of these buildings have had wall ties and/or diaphragm strengthening added as part of other permitted work. The project descriptions in the older permit records are generally short and do not include the full list of work done on the project.

The retrofit status for the building stock is shown in Figure 27. From this chart, it is clear that the one and two story buildings are predominantly un-retrofitted, while higher percentages of the taller buildings have undergone some type of retrofit.

## Figure 26 Locations of Substantial Alterations URM in Seattle

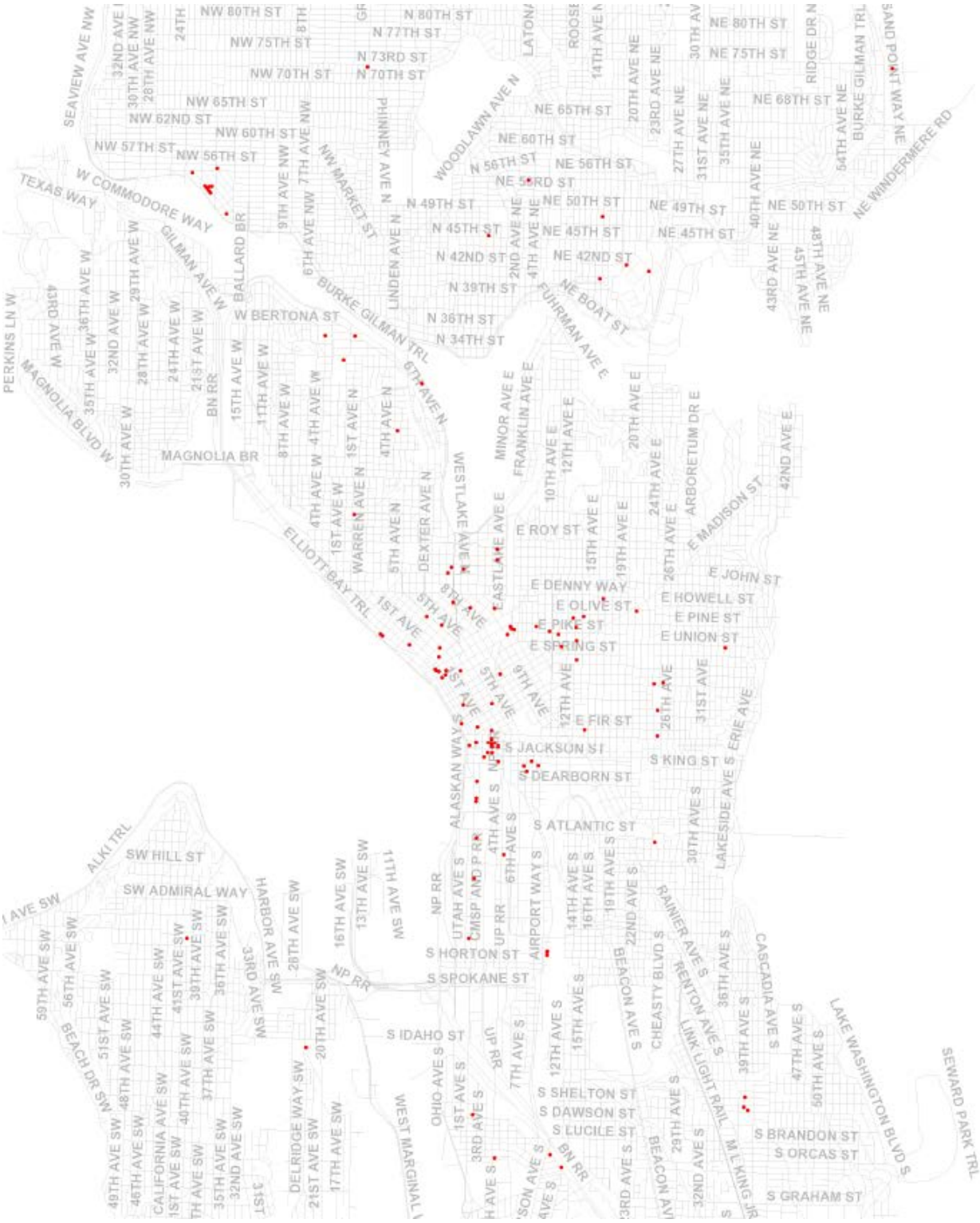
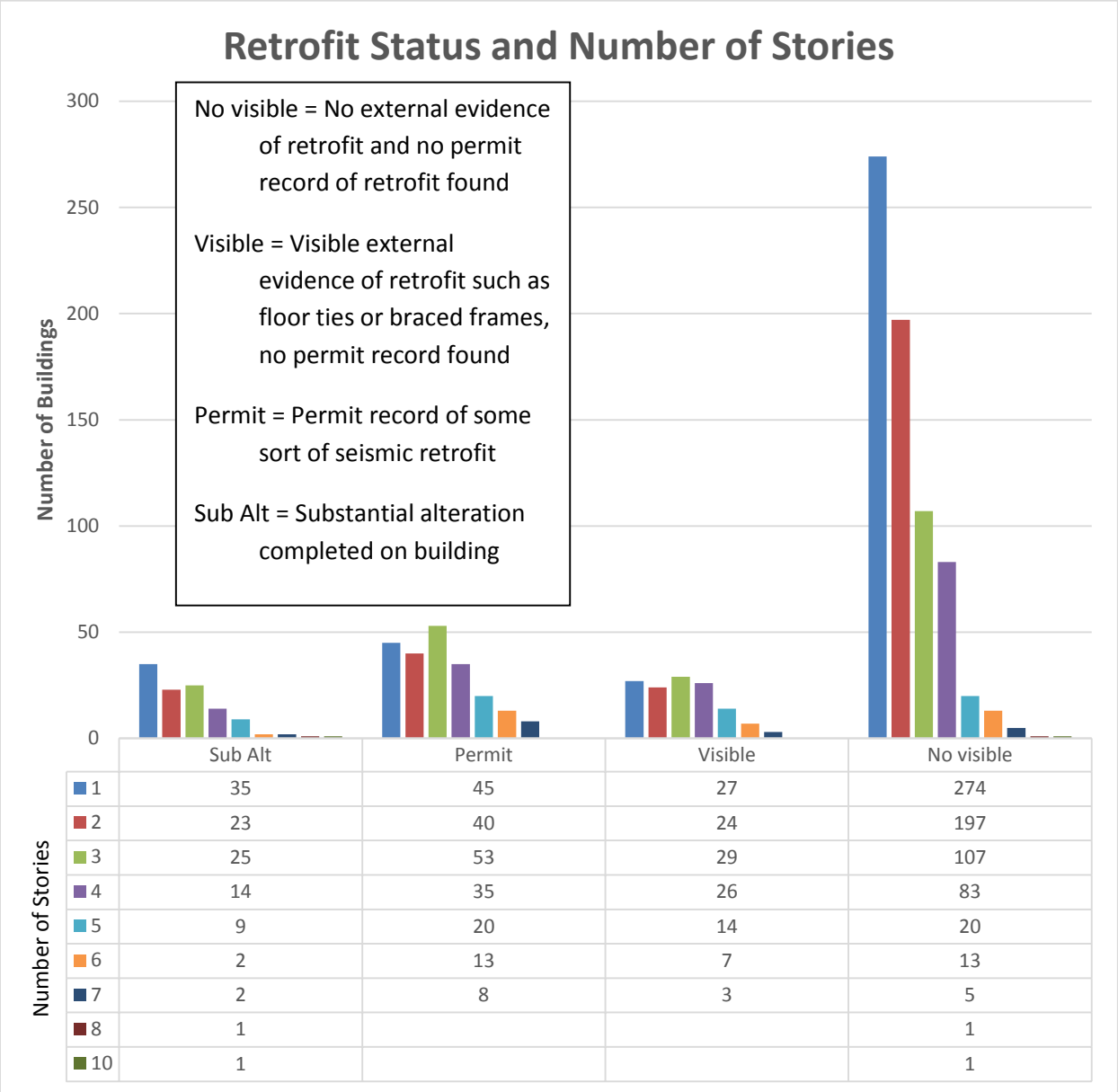


**Figure 27 Retrofit Status and Number of Stories**




| Number of Stories | Sub Alt | Permit | Visible | No visible |
|---|---|---|---|---|
| 1 | 35 | 45 | 27 | 274 |
| 2 | 23 | 40 | 24 | 197 |
| 3 | 25 | 53 | 29 | 107 |
| 4 | 14 | 35 | 26 | 83 |
| 5 | 9 | 20 | 14 | 20 |
| 6 | 2 | 13 | 7 | 13 |
| 7 | 2 | 8 | 3 | 5 |
| 8 | 1 | | | 1 |
| 10 | 1 | | | 1 |

# 4 Risk Categories

The Policy Committee previously determined that the URM buildings would fall into three risk categories. The risk category establishes the timeline for the retrofits with critical risk buildings having to meet a shorter time frame for completing the upgrade. **Critical risk** is assigned to buildings that contain schools, preschool through college, and emergency facilities such as hospitals, fire stations, emergency operations centers, etc. **High risk** is a category assigned to buildings taller than three stories in liquefaction zones (identified in Seattle's Environmentally Critical Areas Ordinance as ECA5) and potential slide areas that include steep slopes (ECA1), potential slide areas (ECA2), and known slide areas (ECA8). High risk is also assigned to all buildings with an occupant load greater than 100 people in an assembly occupancy, such as larger restaurants, clubs, and performance spaces. All other buildings are in the **medium risk** category. Figure 29 shows the locations of URMs, the liquefaction zones, and slide areas.

Approximately 7 percent of the buildings on the list are in the critical risk category, and 15.5 percent are in the high risk category. About 78 percent of the buildings will be subject to the timeline of the medium risk category.

During the policy development, a concern was expressed about how many critical and high risk buildings were located in the different neighborhood areas. The concern was that there could be more concentrated damage in certain areas, and the policy committee wanted to understand that. In response to that request, Figure 30 and Table 3 show how many of each risk category are present in each neighborhood. As expected, Pioneer Square/Chinatown International District and Duwamish/SODO have a high percentage of high risk buildings because nearly the whole neighborhood is in the liquefaction zone. Capitol Hill, Queen Anne, and Downtown have a higher percentage of high risk because of the concentration of larger restaurants, clubs, and performance spaces in these neighborhoods.

**Figure 28 Number of Buildings in Each Risk Category**

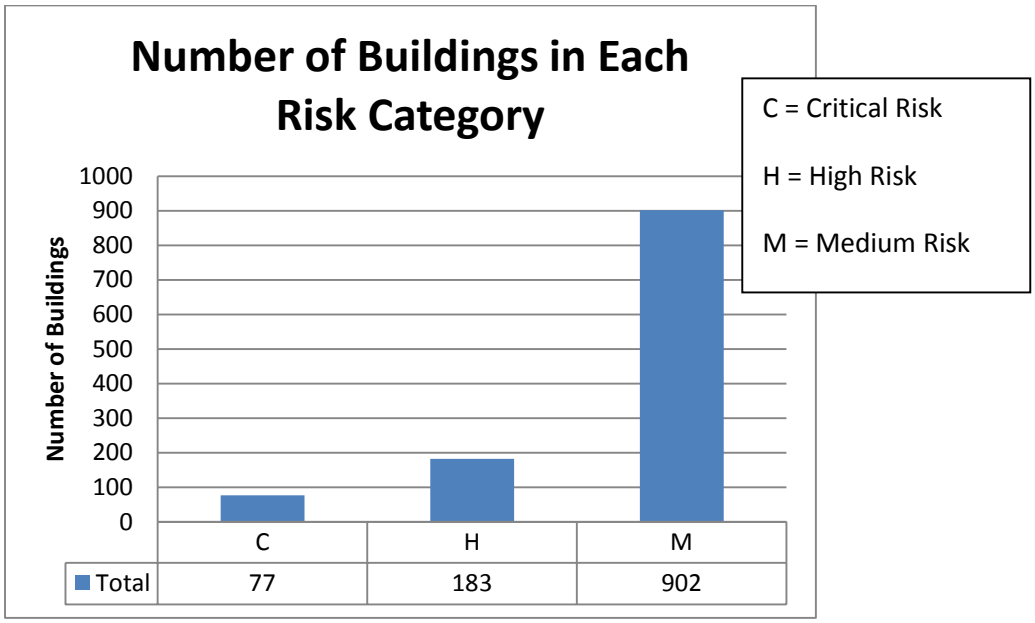


**Figure 29 URM Locations with Slide Areas and Liquefaction Zones**

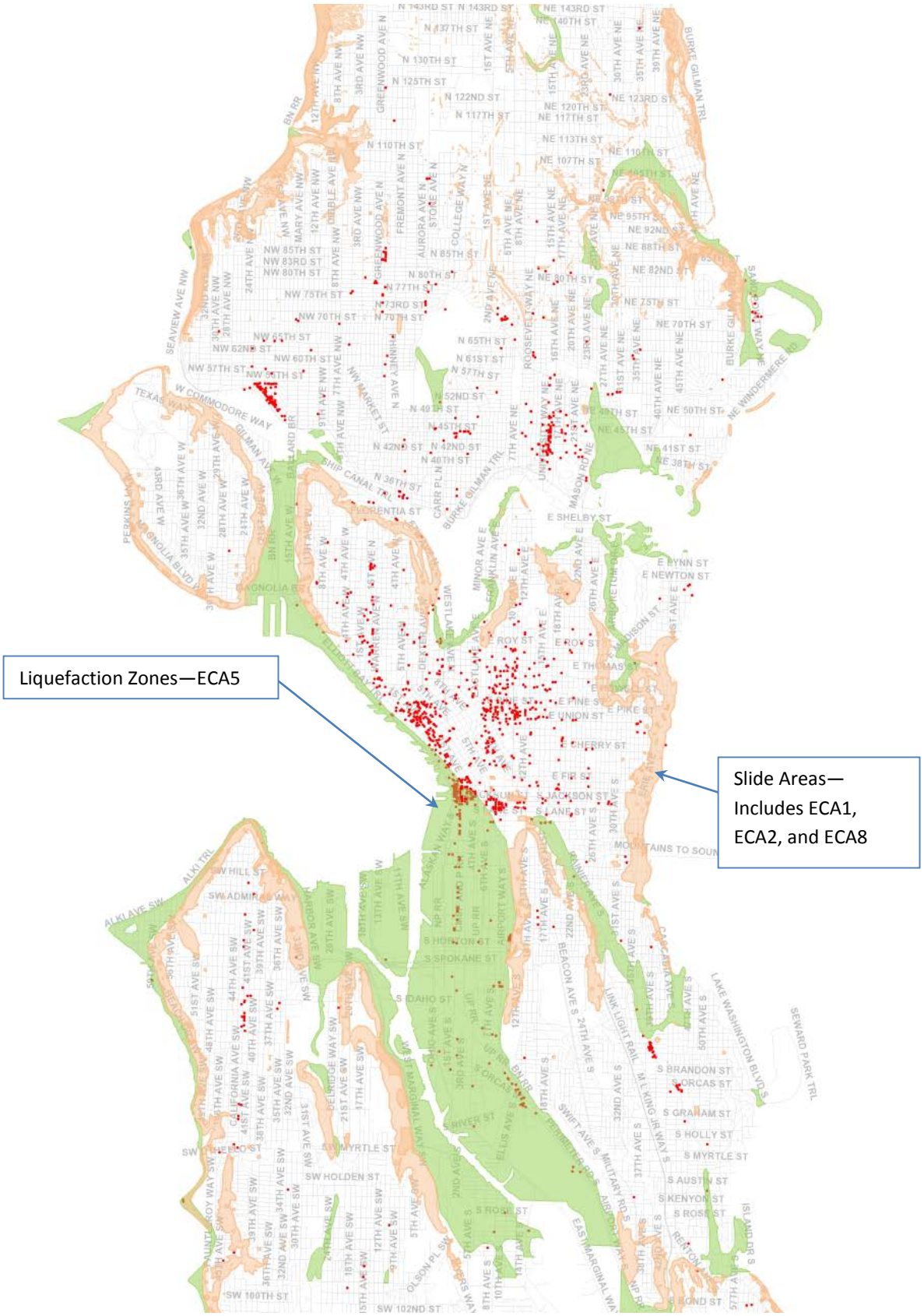
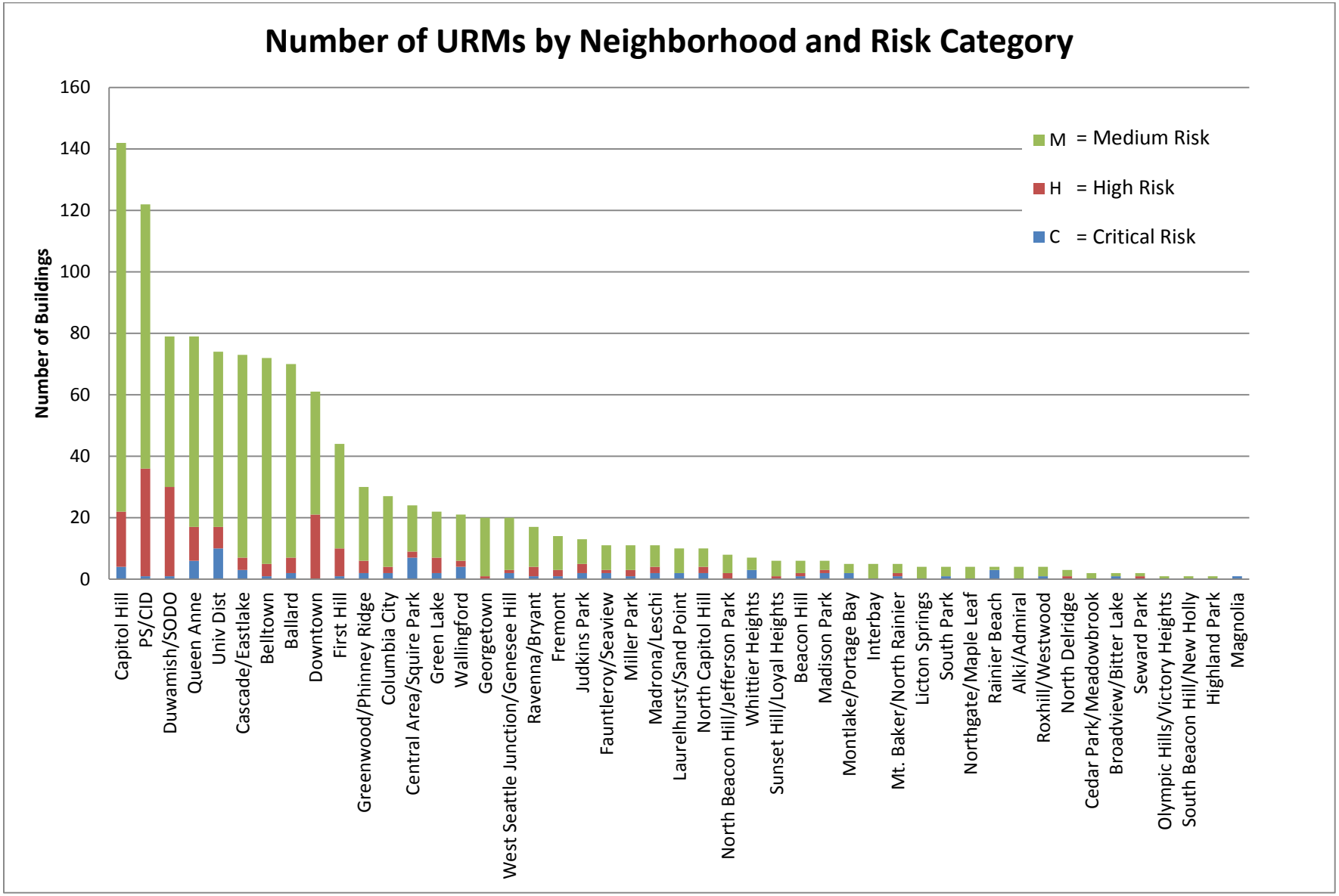


**Figure 30 Number of URMs by Neighborhood and Risk Category**



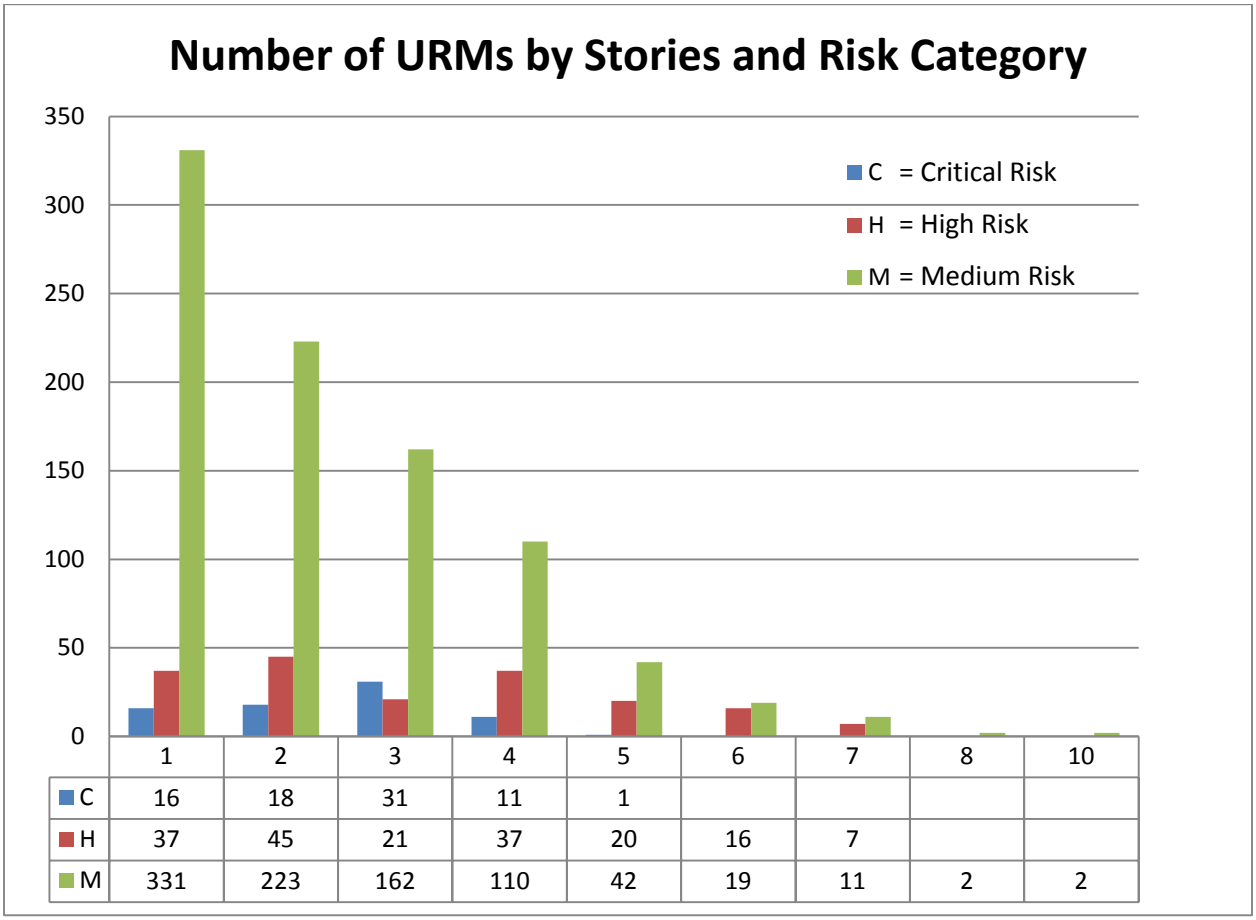
## Table 3 Number of URMs per Risk Categories by Neighborhood

| Neighborhood | C | H | M |
|---|---|---|---|
| Alki/Admiral | | | 4 |
| Ballard | 2 | 5 | 63 |
| Beacon Hill | 1 | 1 | 4 |
| Belltown | 1 | 4 | 67 |
| Broadview/Bitter Lake | 1 | | 1 |
| Capitol Hill | 4 | 18 | 120 |
| Cascade/Eastlake | 3 | 4 | 66 |
| Cedar Park/Meadowbrook | | | 2 |
| Central Area/Squire Park | 7 | 2 | 15 |
| Columbia City | 2 | 2 | 23 |
| Downtown | | 21 | 40 |
| Duwamish/SODO | 1 | 29 | 49 |
| Fauntleroy/Seaview | 2 | 1 | 8 |
| First Hill | 1 | 9 | 34 |
| Fremont | 1 | 2 | 11 |
| Georgetown | | 1 | 19 |
| Green Lake | 2 | 5 | 15 |
| Greenwood/Phinney Ridge | 2 | 4 | 24 |
| Highland Park | | | 1 |
| Interbay | | | 5 |
| Judkins Park | 2 | 3 | 8 |
| Laurelhurst/Sand Point | 2 | | 8 |
| Licton Springs | | | 4 |
| Madison Park | 2 | 1 | 3 |
| Madrona/Leschi | 2 | 2 | 7 |
| Magnolia | 1 | | |
| Miller Park | 1 | 2 | 8 |
| Montlake/Portage Bay | 2 | | 3 |
| Mt. Baker/North Rainier | 1 | 1 | 3 |
| North Beacon Hill/Jefferson Park | | 2 | 6 |
| North Capitol Hill | 2 | 2 | 6 |
| North Delridge | | 1 | 2 |
| Northgate/Maple Leaf | | | 4 |
| Olympic Hills/Victory Heights | | | 1 |
| PS/CID | 1 | 35 | 86 |
| Queen Anne | 6 | 11 | 62 |
| Rainier Beach | 3 | | 1 |
| Ravenna/Bryant | 1 | 3 | 13 |
| Roxhill/Westwood | 1 | | 3 |
| Seward Park | | 1 | 1 |
| South Beacon Hill/New Holly | | | 1 |
| South Park | 1 | | 3 |
| Sunset Hill/Loyal Heights | | 1 | 5 |
| Univ Dist | 10 | 7 | 57 |
| Wallingford | 4 | 2 | 15 |
| West Seattle Junction/Genesee Hill | 2 | 1 | 17 |
| Whittier Heights | 3 | | 4 |
| **Grand Total** | **77** | **183** | **902** |

## 4.1 Building Height and Risk Category

Looking at the data in some other ways, Figure 31 shows the heights of buildings in the various risk categories.

**Figure 31 Risk Category by Story Height**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| C | 16 | 18 | 31 | 11 | 1 | | | | |
| H | 37 | 45 | 21 | 37 | 20 | 16 | 7 | | |
| M | 331 | 223 | 162 | 110 | 42 | 19 | 11 | 2 | 2 |

## 4.2 Occupancy Types

In order to understand the uses of the buildings in the survey, each building is assigned one or more occupancy types. The full explanation of occupancy type is included in Rapid Visual Screening of Buildings for Potential Seismic Hazards (FEMA 154). The section of FEMA 154 dealing with occupancy classification is included in Appendix D: FEMA 154 Occupancy Categories and Loads. The occupancy of each building was generally taken from the King County Assessor's data based on the uses of the building. If more recent Seattle DCI permit records were accessed as part of the review, occupancy was modified based on the currently permitted use Table 4 shows the abbreviations used for the different occupancy types.

**Table 4 Occupancy Type Descriptions**

| Abbreviation | Description |
|---|---|
| **C** | ***Commercial***—retail businesses, financial institution, restaurants, etc. |
| **E** | ***Emergency***—hospitals, fire stations, emergency operation centers, etc. |
| **G** | ***Government***—park facilities, libraries, community centers, etc. |
| **I** | ***Industrial***—factories, warehouses, manufacturing, etc. |
| **O** | ***Office*** |
| **P** | ***Public Assembly***—assembly occupancy greater than 100 in one space, restaurants, clubs, theaters, etc. |
| **R** | ***Residential***—apartments, condominiums, dormitories, hotels, group homes, etc. |
| **S** | ***Schools***—public and private schools, preschool through college |
| **V** | ***Vacant*** |

### 4.2.1 Combinations of Occupancies

Since many of the buildings on the list contain multiple uses, we developed a strategy for analyzing the data. The most common combinations are reported as separate categories, while the others are combined into a "mixed use" category. The following table shows the combinations used in this report and for analysis of the data.

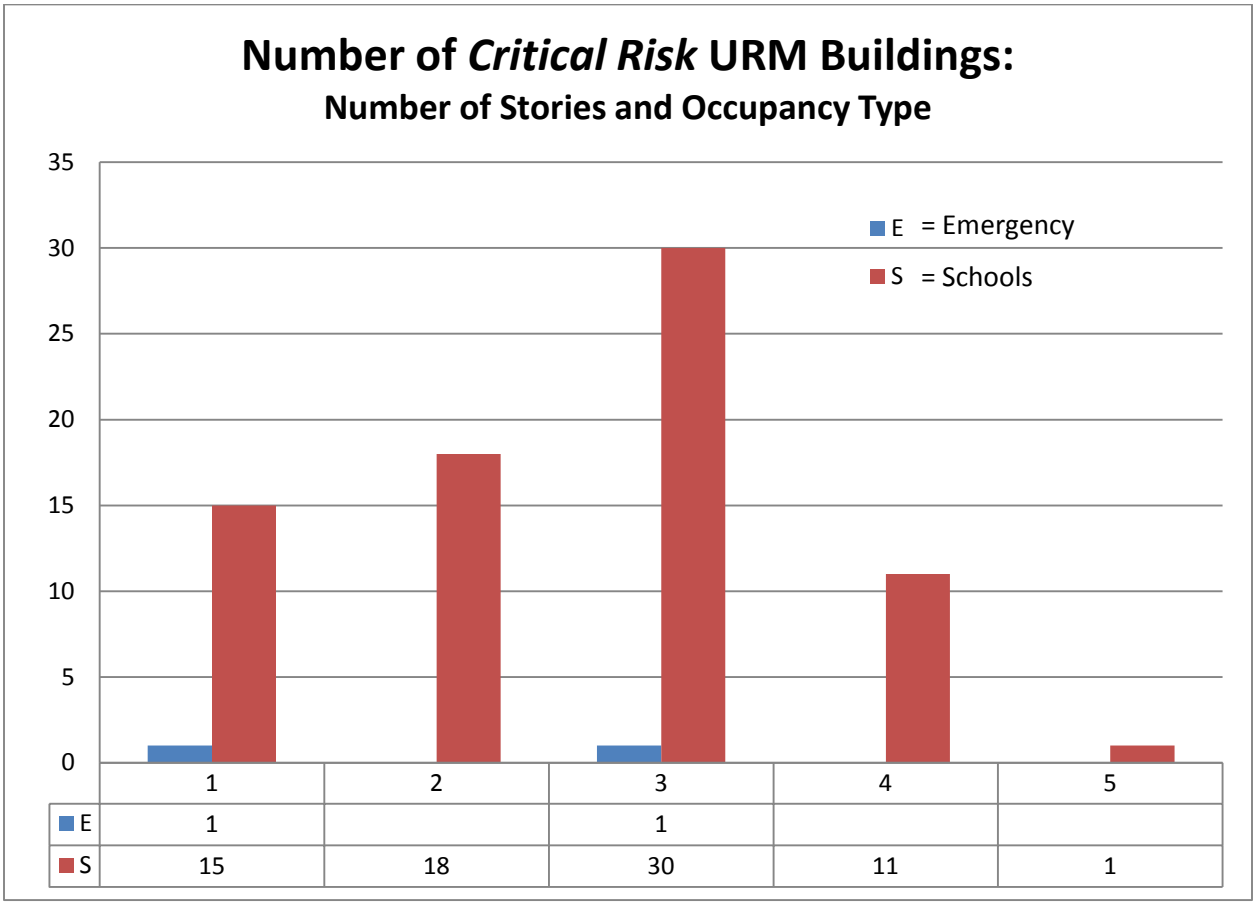
**Table 5 Report Occupancy Categories**

| Report Occupancy | Survey Combinations |
|---|---|
| **C** | C, C/I, C/V |
| **C/O** | C/O |
| **C/R** | C/R |
| **E** | E |
| **G** | G |
| **I** | I |
| **Mixed** | C/R/O, O/R, R/O/I |
| **O** | O, O/I |
| **P** | C/O/P, C/P, C/R/P, G/P, O/P, O/P/G, P, R/O/P, R/P |
| **R** | R, R/G, R/I |
| **S** | C/R/S, C/S, O/S, P/S, S |
| **V** | V |

### 4.2.2 Risk and Occupancy Charts

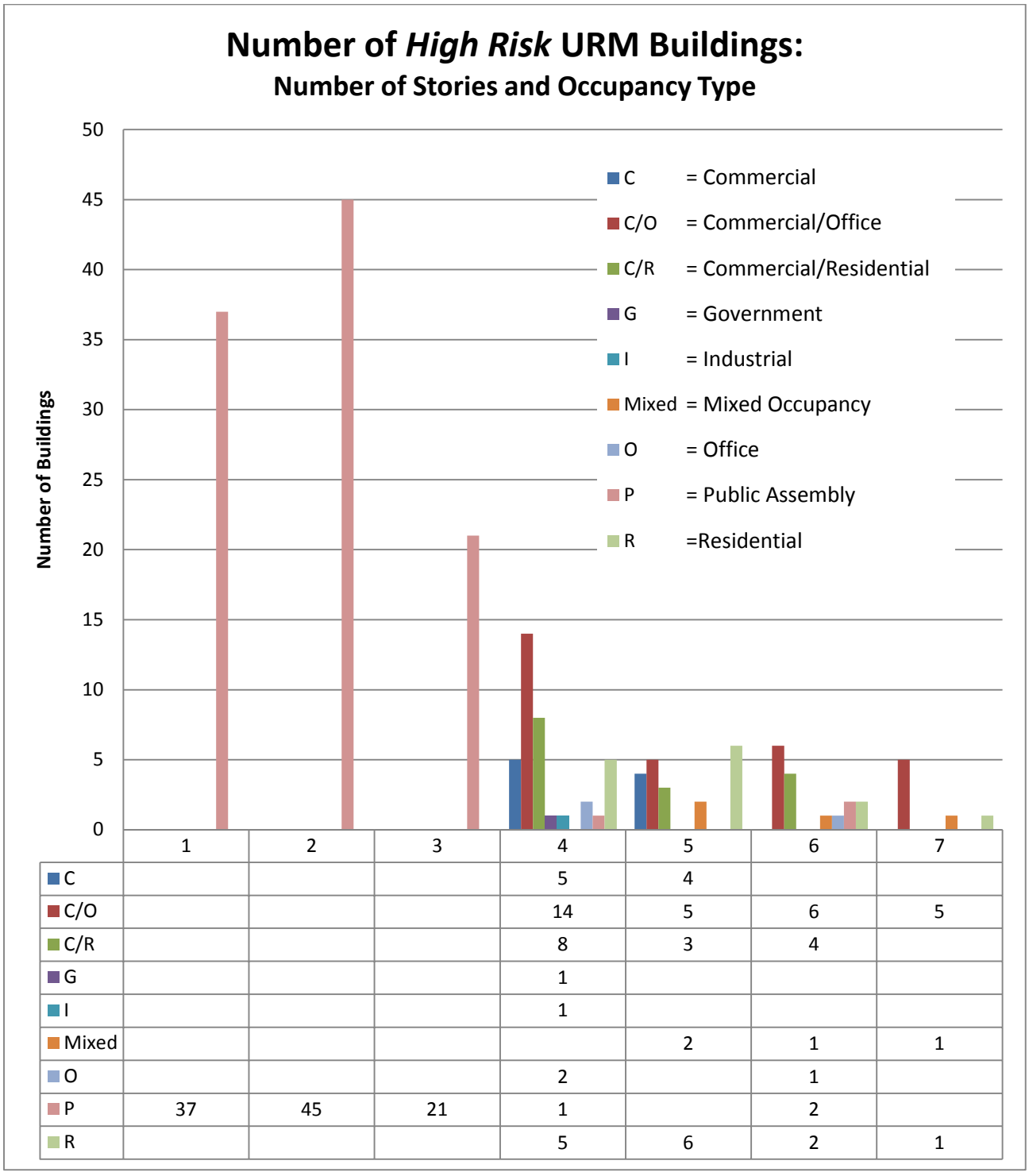
The following charts (Figure 32 through Figure 34) show the occupancy types represented in the different risk categories. Note that the definition of high risk dictates that the only buildings under four stories will be buildings in the public assembly category. Because the public assembly category includes buildings with assembly spaces with as few as 100 occupants, there are a number of restaurants and clubs in the high risk category. Additionally, the taller assembly category buildings are generally mixed use buildings containing at least one tenant with an assembly occupancy. The number of occupants for assembly spaces were obtained from Seattle DCI permit records and certificates of occupancy.

**Figure 32 Occupancy Type of Critical Risk Buildings**



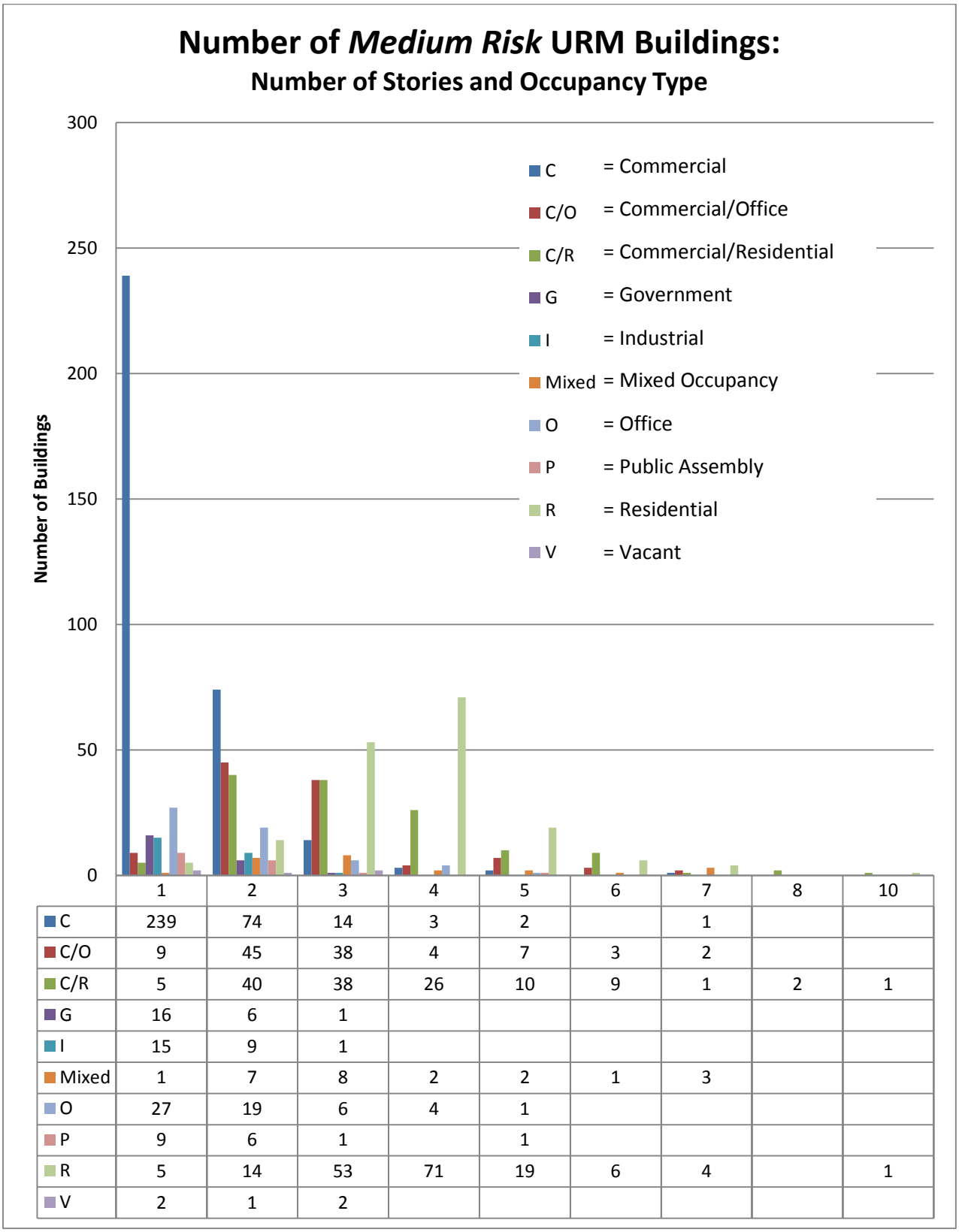

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| E | 1 | | 1 | | |
| S | 15 | 18 | 30 | 11 | 1 |

**Figure 33 Occupancy Types of High Risk Buildings**




| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| C | | | | 5 | 4 | | |
| C/O | | | | 14 | 5 | 6 | 5 |
| C/R | | | | 8 | 3 | 4 | |
| G | | | | 1 | | | |
| I | | | | 1 | | | |
| Mixed | | | | | 2 | 1 | 1 |
| O | | | | 2 | | 1 | |
| P | 37 | 45 | 21 | 1 | | 2 | |
| R | | | | 5 | 6 | 2 | 1 |

**Figure 34 Occupancy Types of Medium Risk Buildings**



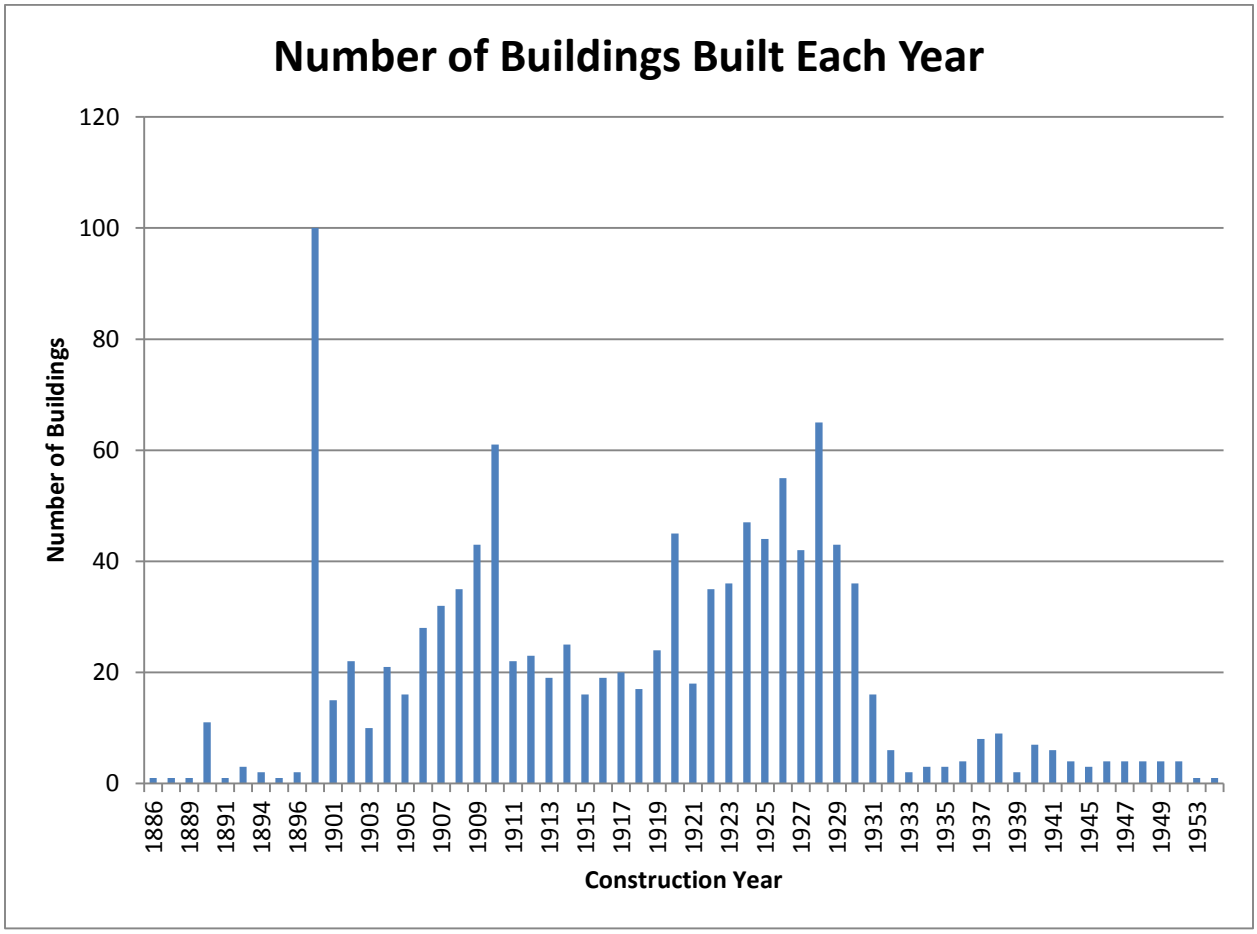

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| C | 239 | 74 | 14 | 3 | 2 | | 1 | | |
| C/O | 9 | 45 | 38 | 4 | 7 | 3 | 2 | | |
| C/R | 5 | 40 | 38 | 26 | 10 | 9 | 1 | 2 | 1 |
| G | 16 | 6 | 1 | | | | | | |
| I | 15 | 9 | 1 | | | | | | |
| Mixed | 1 | 7 | 8 | 2 | 2 | 1 | 3 | | |
| O | 27 | 19 | 6 | 4 | 1 | | | | |
| P | 9 | 6 | 1 | | 1 | | | | |
| R | 5 | 14 | 53 | 71 | 19 | 6 | 4 | | 1 |
| V | 2 | 1 | 2 | | | | | | |

# 5 Building Characteristics

## 5.1 Year of Construction

The buildings on the list were built between 1886 and 1954, with the great majority of them built before 1930. The large number of buildings shown as built in 1900 is a result of the King County Assessor's Office changing the county records for all buildings built prior to 1900. These 100 buildings should be spread over the preceding 15 or so years. A different date of construction was listed if it was found easily through historical records, plaques on the building, or dates on the cornerstone.

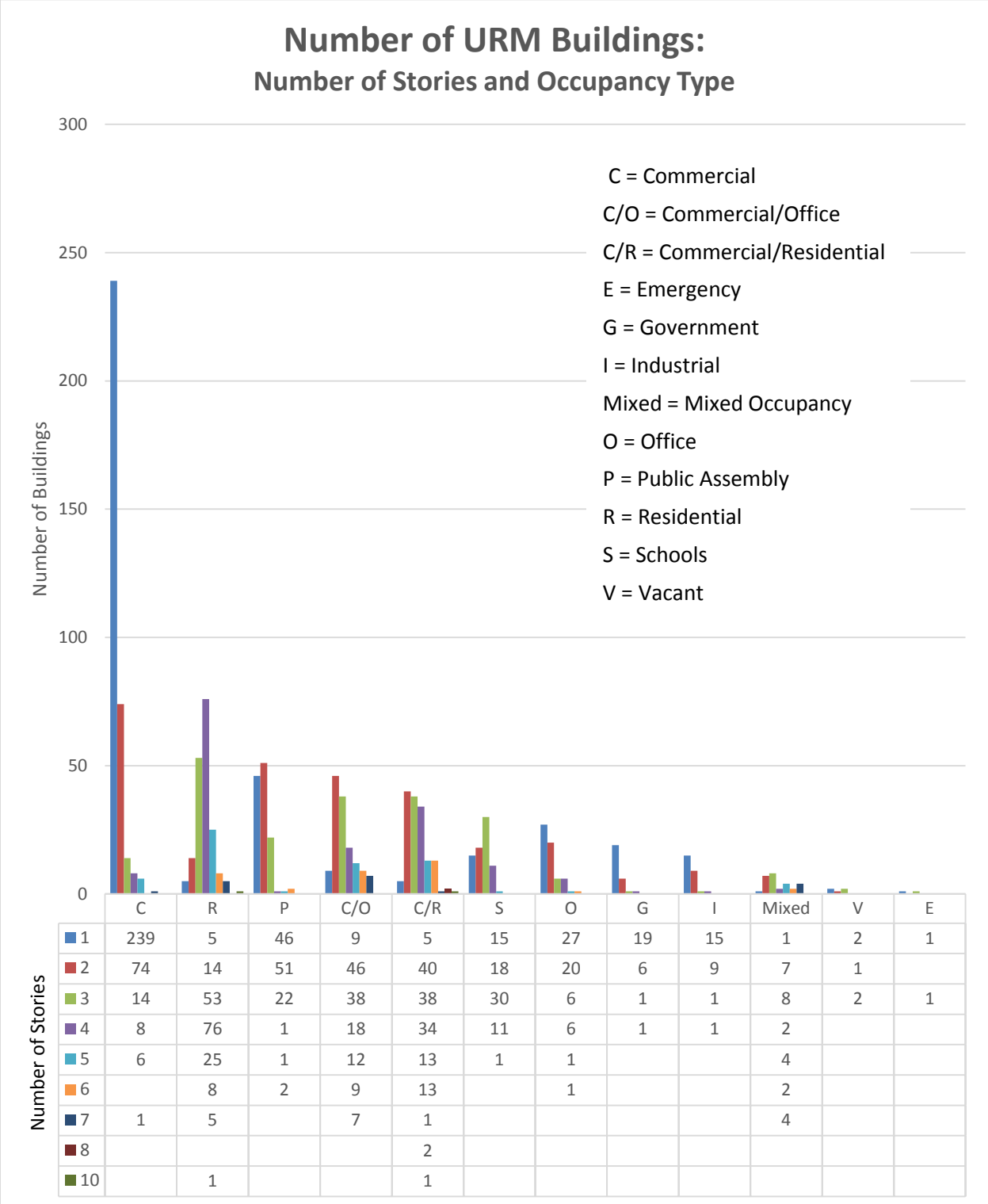
**Figure 35 Year of Construction**




## 5.2 Building Size

The buildings on the list vary from one to ten stories in height. Each occupancy type tends to have a different profile of story heights. For example, commercial buildings are predominantly one and two stories, while residential buildings are more likely to be three or four stories. Figure 36 shows the distribution of building heights for each occupancy type.

**Figure 36 Number of Stories and Occupancy Types**

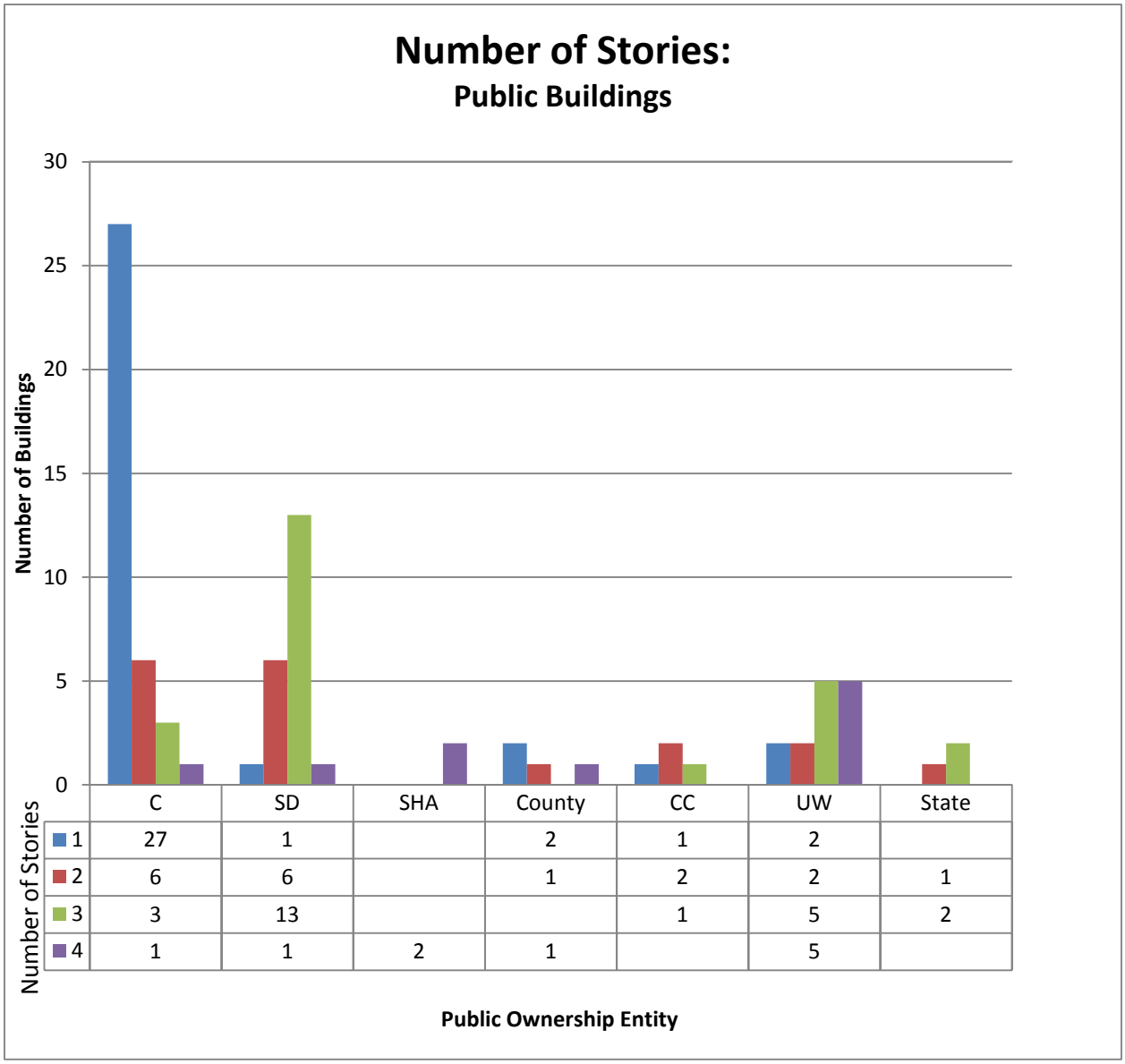



| Number of Stories | C | R | P | C/O | C/R | S | O | G | I | Mixed | V | E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 239 | 5 | 46 | 9 | 5 | 15 | 27 | 19 | 15 | 1 | 2 | 1 |
| 2 | 74 | 14 | 51 | 46 | 40 | 18 | 20 | 6 | 9 | 7 | 1 | |
| 3 | 14 | 53 | 22 | 38 | 38 | 30 | 6 | 1 | 1 | 8 | 2 | 1 |
| 4 | 8 | 76 | 1 | 18 | 34 | 11 | 6 | 1 | 1 | 2 | | |
| 5 | 6 | 25 | 1 | 12 | 13 | 1 | 1 | | | 4 | | |
| 6 | | 8 | 2 | 9 | 13 | | 1 | | | 2 | | |
| 7 | 1 | 5 | | 7 | 1 | | | | | 4 | | |
| 8 | | | | | 2 | | | | | | | |
| 10 | | 1 | | | 1 | | | | | | | |

### 5.2.1 Public Buildings

For the purposes of this report, public buildings are those that are owned by the City of Seattle, King County, the State of Washington, the Seattle Public Schools and the Seattle Housing Authority. Figure 37 shows the building heights for the public buildings, and Figure 38 shows the total gross square feet of the buildings owned by these entities. The buildings owned by the State of Washington are subdivided into general state owned buildings and buildings owned by the University of Washington and the community college system.

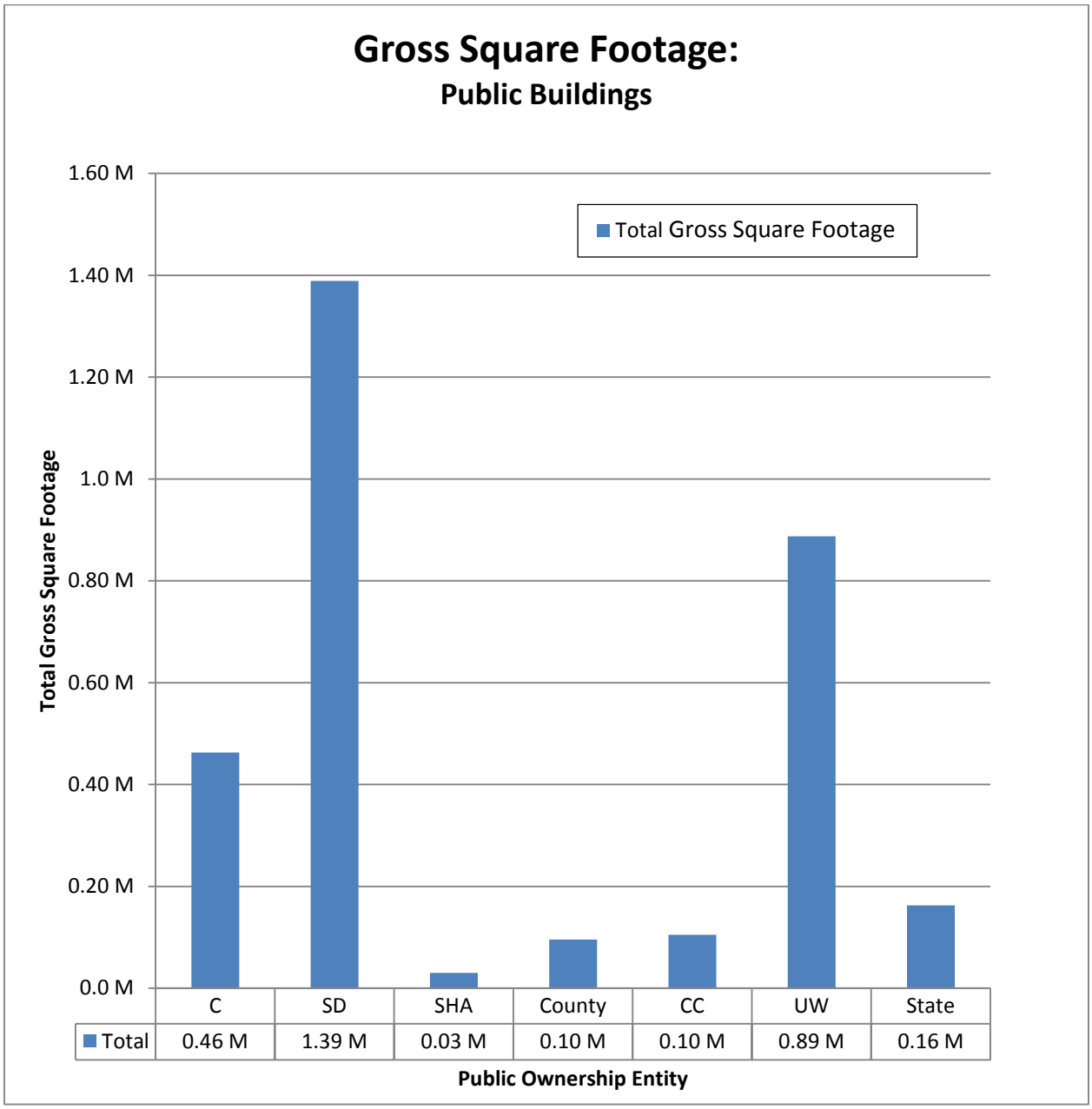
**Figure 37 Number of Stories of Public Building**




| Number of Stories | C | SD | SHA | County | CC | UW | State |
|---|---|---|---|---|---|---|---|
| 1 | 27 | 1 | | 2 | 1 | 2 | |
| 2 | 6 | 6 | | 1 | 2 | 2 | 1 |
| 3 | 3 | 13 | | | 1 | 5 | 2 |
| 4 | 1 | 1 | 2 | 1 | | 5 | |

C=City of Seattle; SD= Seattle Public Schools; SHA=Seattle Housing Authority; County=King County; CC=Community Colleges; UW=University of Washington; State=State of Washington

**Figure 38 Gross Square Footage of Public Buildings**




C=City of Seattle; SD= Seattle Public Schools; SHA=Seattle Housing Authority; County=King County; CC=Community Colleges; UW=University of Washington; State=State of Washington

### 5.2.2 Residential Buildings

Many of the buildings on the list of URMs contain residential units. Some of the buildings are small apartment buildings, while others are mixed-use buildings including commercial and/or office uses. This section of the report has charts (Figure 39 and Figure 40) showing the distribution of residential buildings in all categories of mixed use. Therefore, some of the square footage shown would not technically be residential in nature, but it is in a building with some residential occupancy.

Figure 39 Number of Stories: All Residential Occupancies

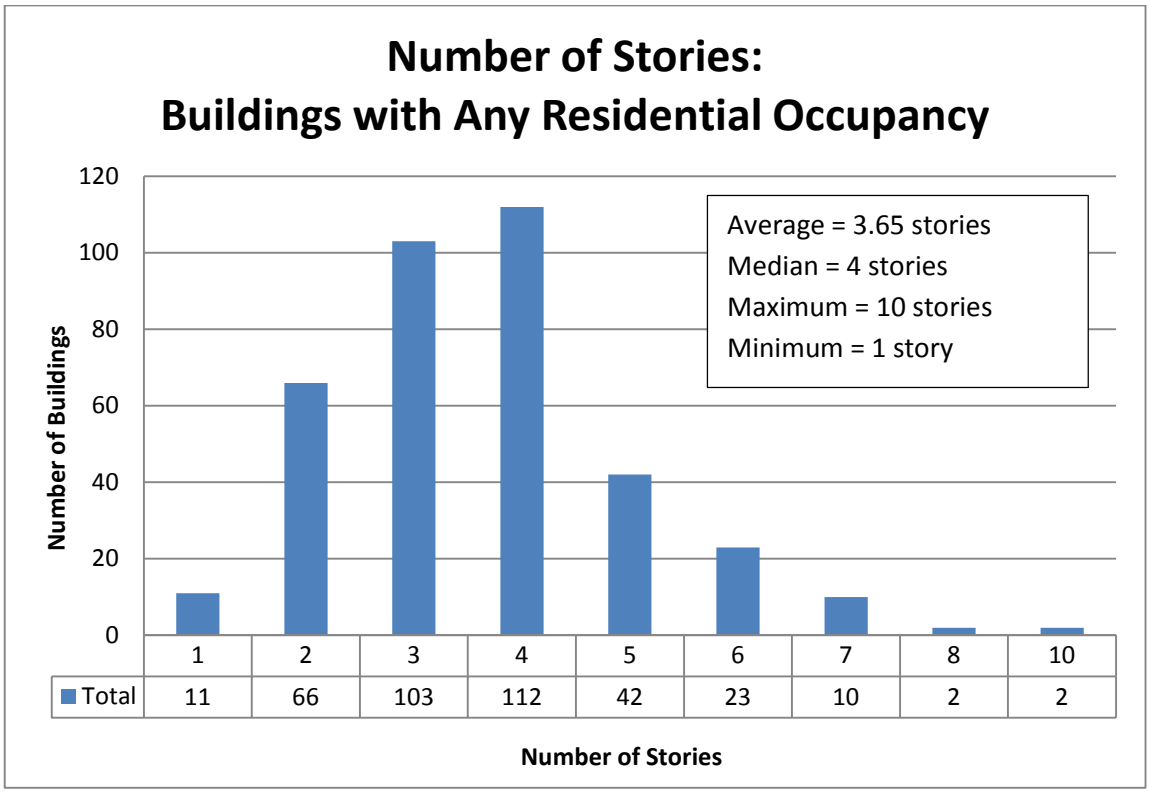
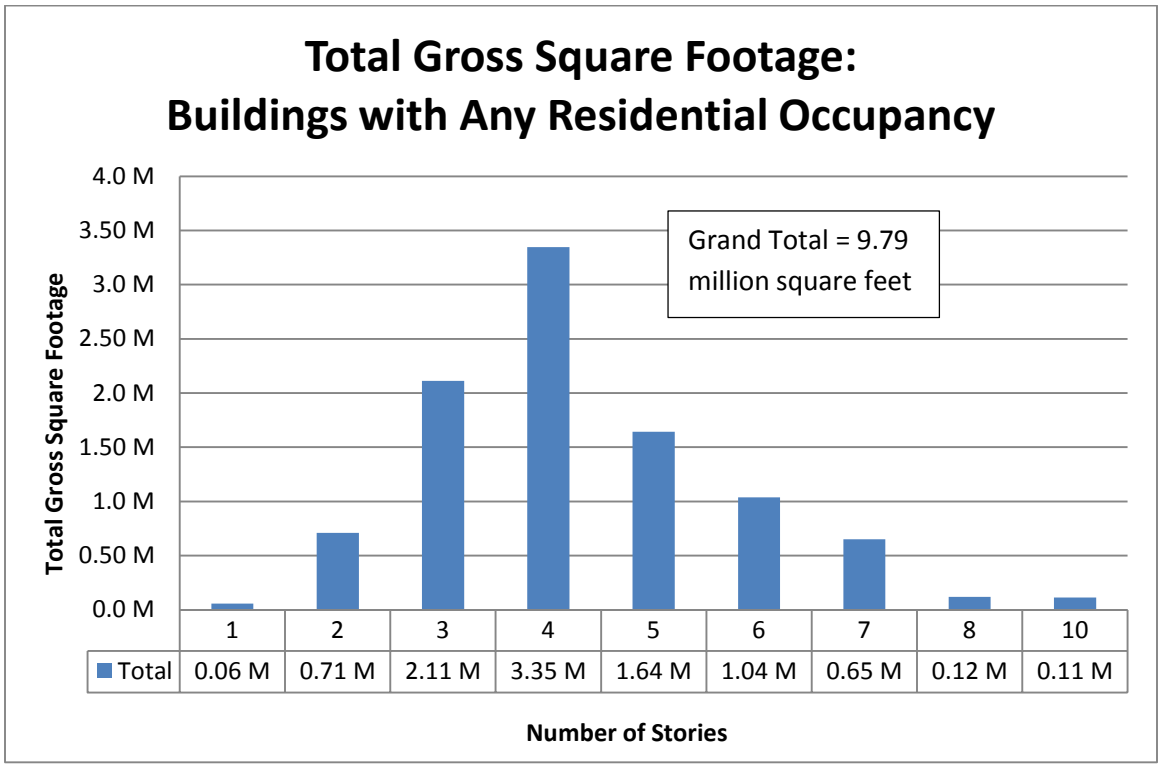



Figure 40 Total Square Footage and Number of Stories: All Residential Occupancies



## 5.3 Occupancy Type and Occupant Load

In addition to the occupancy type described previously, data was also collected on what FEMA 154 terms "occupant load". Occupant load is an approximate measure of the number of people that live or work in a particular structure. Since the FEMA 154 methodology is suitable for rapid data collection, the occupant load system is approximate. One of three categories is chosen for each building. The categories are shown in the following Table 6.

The data for occupant load was obtained from King County Assessor's records and Seattle DCI permit records when available. For the residential occupancies, the number of units was used with a factor of between one and two people per unit depending on the sizes of the units. Commercial and office occupancies were based on the square footage of the building using the occupants per square foot ranges found in FEMA 154. Generally, the lower densities were used for the occupancy load since they seemed more realistic.

### Table 6 Occupant Load Definition

| Occupant Load | Number of Occupants |
|---|---|
| **1** | 1-10 people |
| **2** | 11-100 people |
| **3** | More than 100 people |

Most of the URMs fall into the higher two occupant load categories, with slightly more of the buildings housing from 11 to 100 people.

### Table 7 Percentage of Each Occupant Load

| Occupant Load | No. of Buildings | Percent of Total |
|---|---|---|
| 1 | 67 | 5.8% |
| 2 | 610 | 52.7% |
| 3 | 481 | 41.5% |

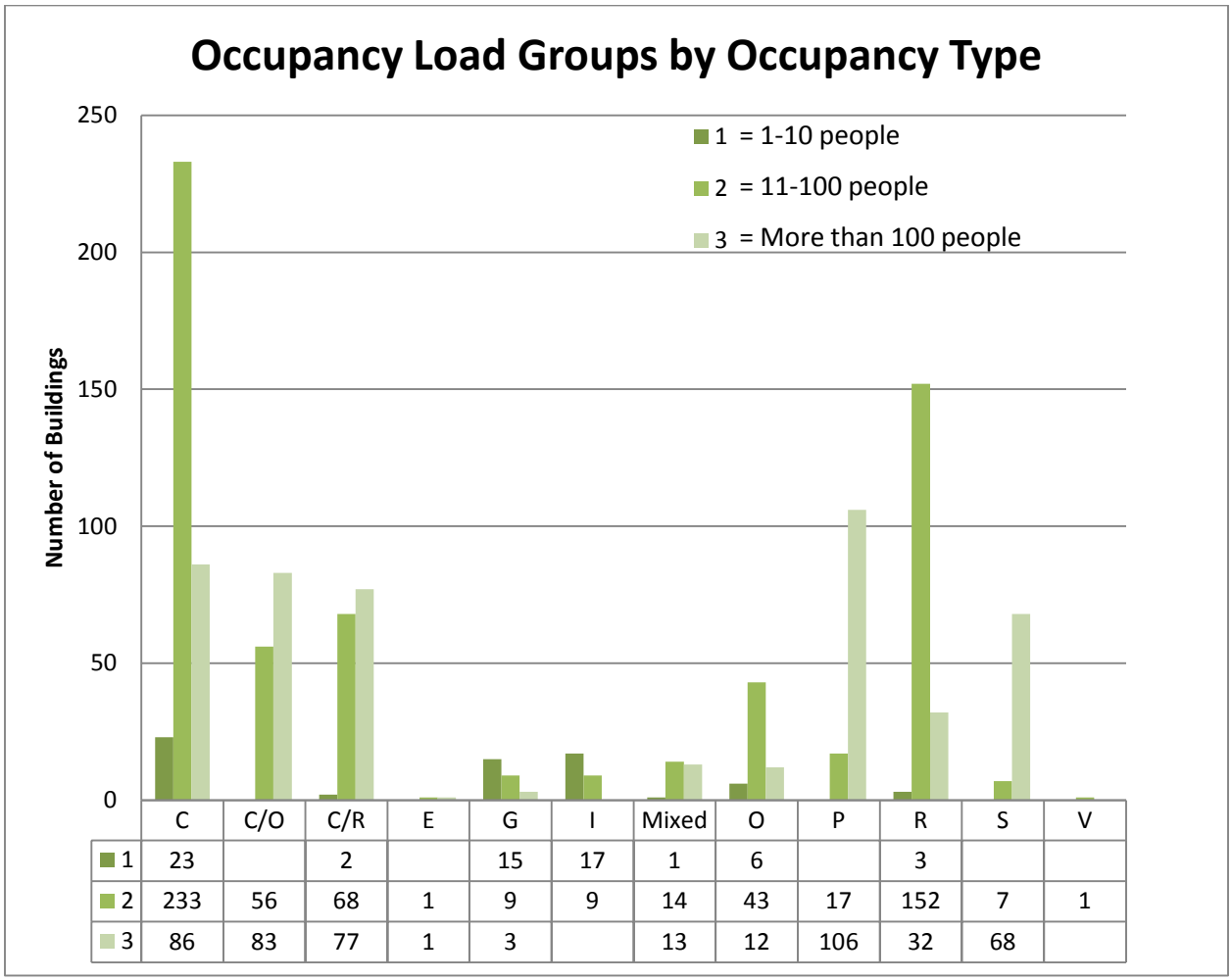
The most common occupancy type is commercial with almost twice as many buildings in this category compared to the next largest group.

Table 8 Percentage of Each Occupancy Type

| Occupancy Type | No. of Buildings | Percent of Total |
|---|---|---|
| **Commercial** | 342 | 29.4% |
| **Residential** | 187 | 16.1% |
| **Commercial/Residential** | 147 | 12.7% |
| **Commercial/Office** | 139 | 12.0% |
| **Public Assembly** | 123 | 10.6% |
| **Schools** | 75 | 6.5% |
| **Office** | 61 | 5.2% |
| **Mixed** | 28 | 2.4% |
| **Government** | 27 | 2.3% |
| **Industrial** | 26 | 2.2% |
| **Vacant** | 5 | 0.4% |
| **Emergency** | 2 | 0.2% |

Figure 41 shows the relative sizes of each occupancy type by charting the occupancy load group for each category.

**Figure 41 Occupancy Load Group by Occupancy Type**




| | C | C/O | C/R | E | G | I | Mixed | O | P | R | S | V |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 23 | | 2 | | 15 | 17 | 1 | 6 | | 3 | | |
| 2 | 233 | 56 | 68 | 1 | 9 | 9 | 14 | 43 | 17 | 152 | 7 | 1 |
| 3 | 86 | 83 | 77 | 1 | 3 | | 13 | 12 | 106 | 32 | 68 | |

## 5.4 Affordable Housing

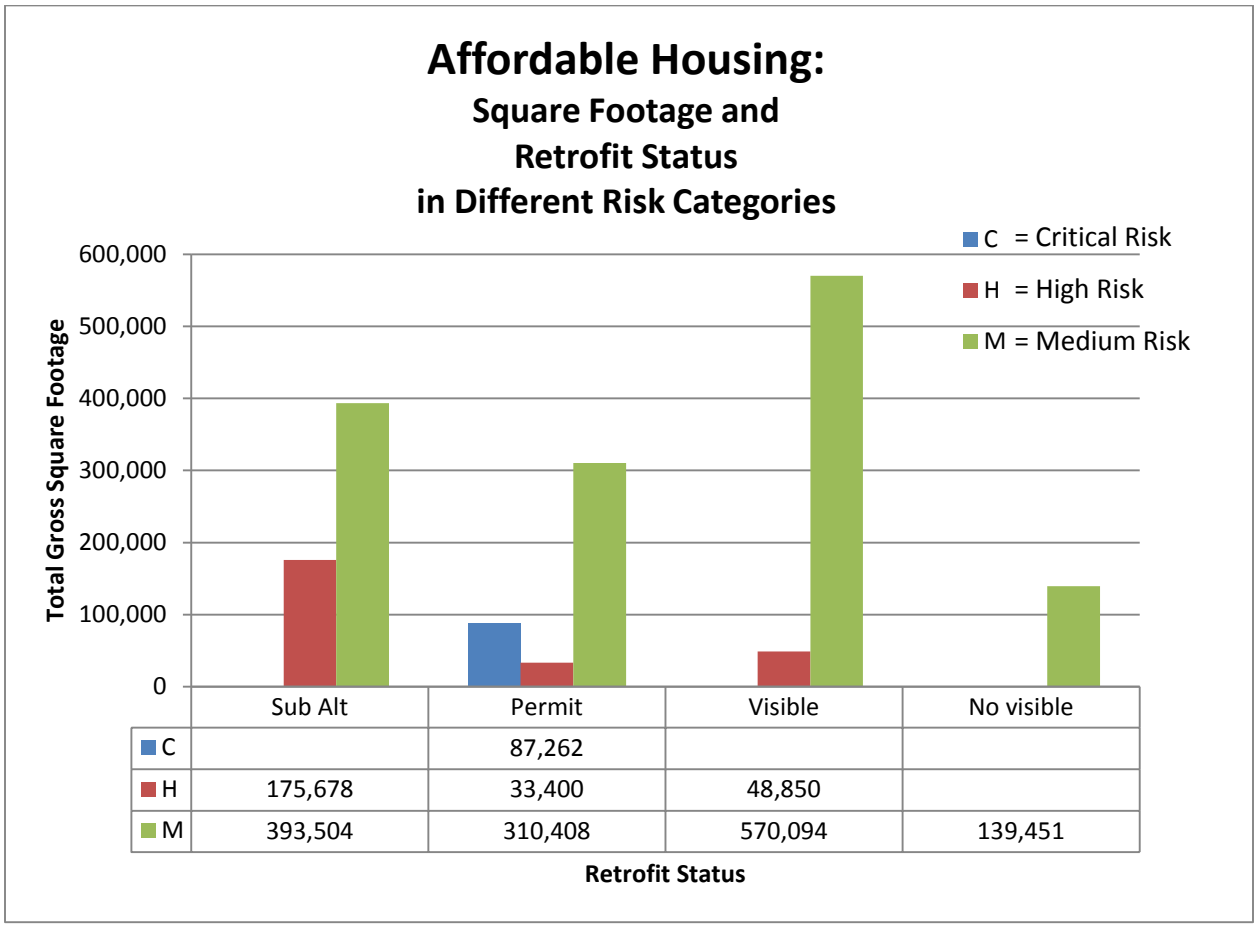
There are different federal, state, and local programs that provide incentives for affordable housing projects. The Seattle Office of Housing provided lists of buildings that have received funding from the Seattle Office of Housing, Housing and Urban Development (HUD), and Low Income Housing Tax Credits (LIHTC). They also provided a list of properties owned by the Seattle Housing Authority. All of these lists were cross-referenced to the URM list to determine which URM buildings contribute to the affordable housing stock in Seattle. These variously funded projects make up the total affordable housing units used in this report.

**Total Affordable Housing Units:**

**2303**

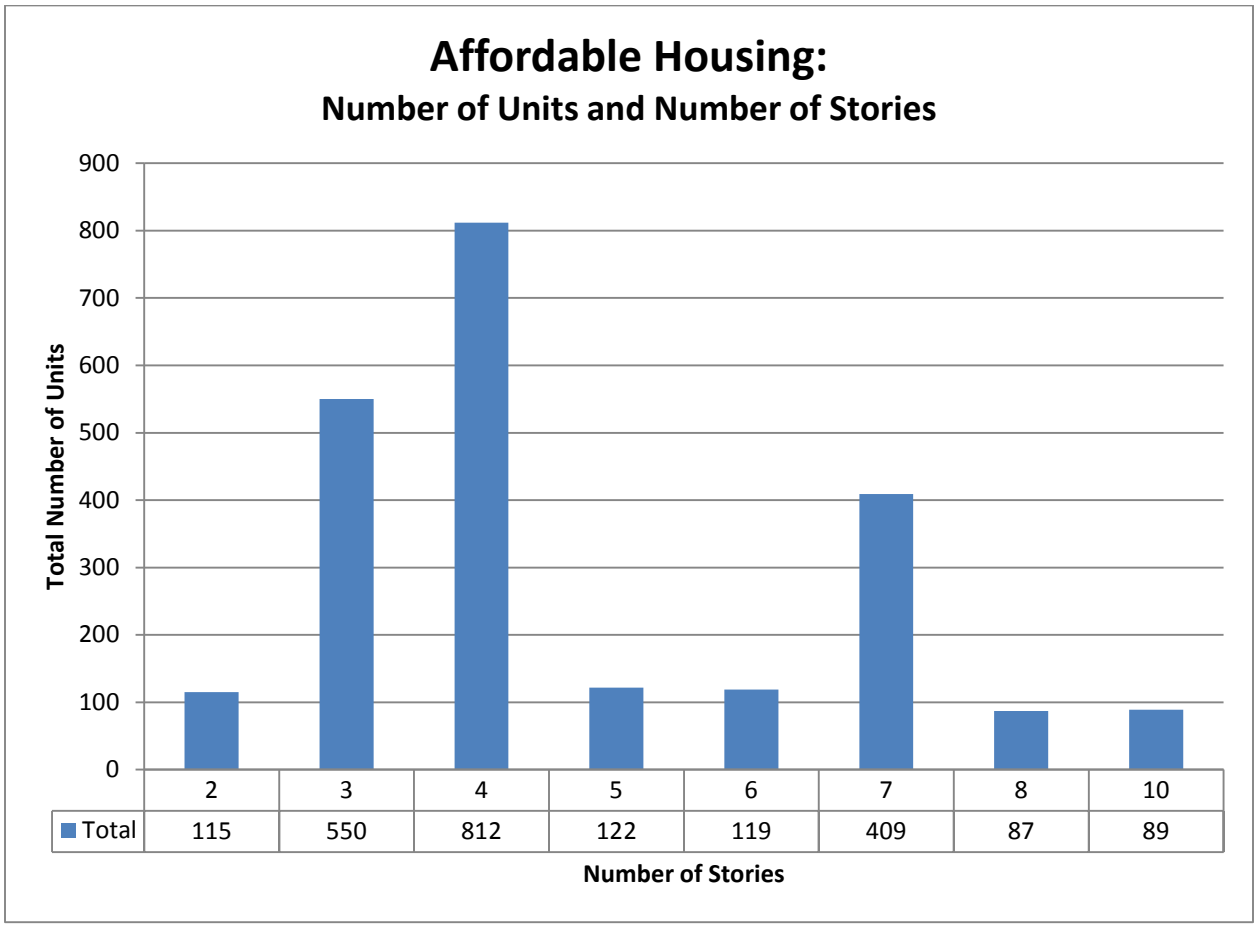
47 buildings on the URM list contain affordable housing units. There are approximately 1.3 million square feet in these 47 buildings. Of these buildings, 5 of them have no evidence of any retrofit.

**Figure 42 Affordable Housing: Square Footage and Retrofit Status in Different Risk Categories**




| | Sub Alt | Permit | Visible | No visible |
|---|---|---|---|---|
| C | | 87,262 | | |
| H | 175,678 | 33,400 | 48,850 | |
| M | 393,504 | 310,408 | 570,094 | 139,451 |

**Figure 43 Affordable Housing: Number of Units and Number of Stories**




## 5.5 Historic Buildings

The URM building stock in Seattle includes many buildings with historic and cultural value. There is a desire to maintain these character structures in the neighborhoods of Seattle. Many of these neighborhoods, such as Belltown, the Pike-Pine area of Capitol Hill, Pioneer Square, the Chinatown-International District, and Ballard, contain clusters of URM structures. The preservation of these structures contributes significantly to the character of these neighborhoods.

There are 384 buildings in the historic category. Historic and landmark buildings include buildings in the following categories: buildings on the City of Seattle's list of Landmark buildings (also includes those on National and State registers), buildings in the City's Historic Districts (Pioneer Square Preservation District, Pike Place Market Historical District) buildings in the City's Landmark Districts (Ballard Avenue Landmark District, Columbia City Landmark District, Sand Point Naval Air Station Landmark District, Harvard-Belmont Landmark District), and buildings in the City's Special Review Districts (International Special Review District, Pike Pine Conservation Overlay). The historic buildings represent all heights, occupancy categories, and retrofit levels.

The key difference for an owner of any of these listed historic buildings is that there will be an additional layer of review for any work on the building. Each individual landmark, and each special or historic

district, has its own review criteria. Some historic buildings are only protected on the outside while some have interior features that are protected as well.

Figure 44 shows the distribution of story heights for the buildings in all the different historic classifications.

**Figure 44 Historic and Landmark Buildings: Number of Stories**

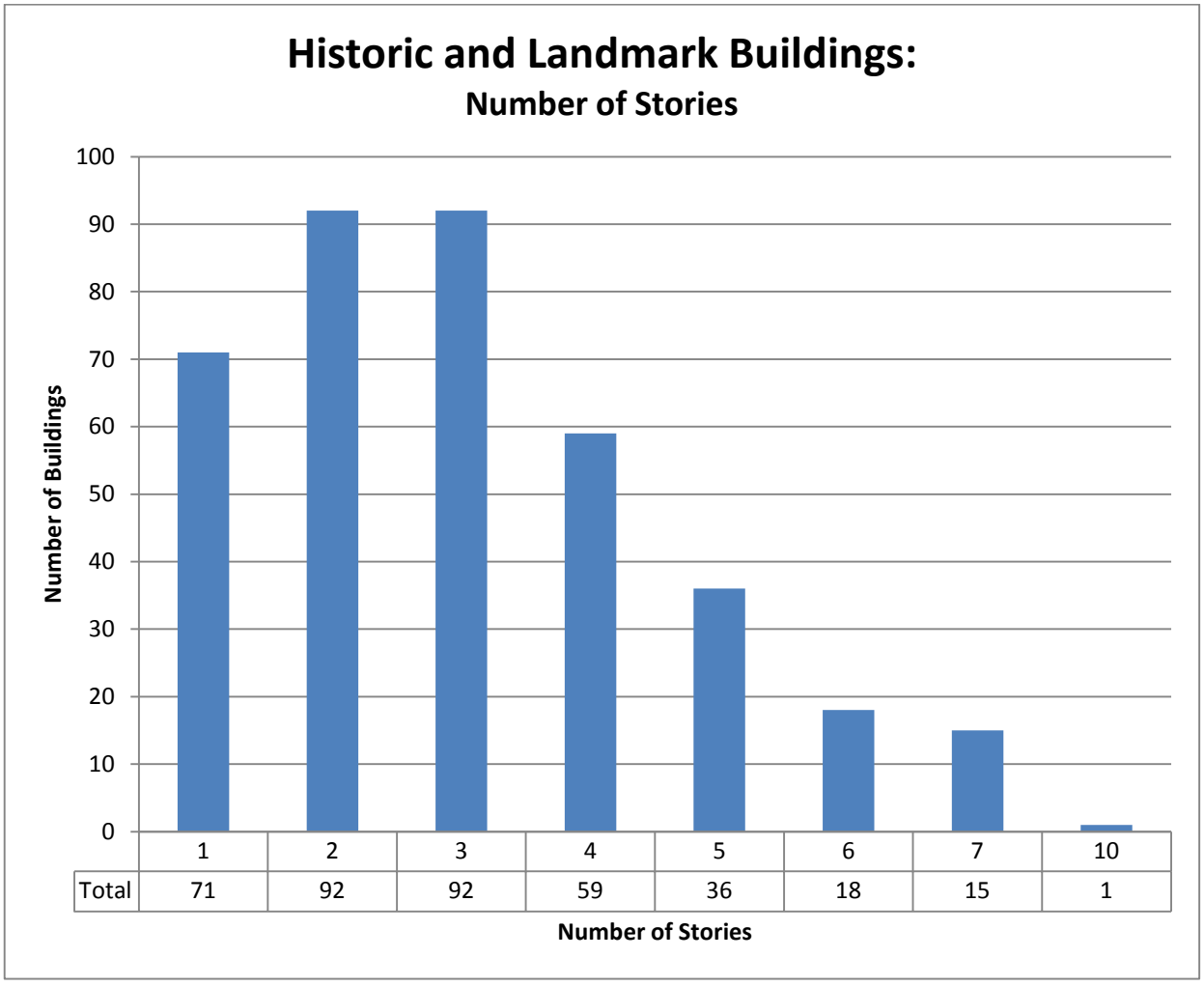
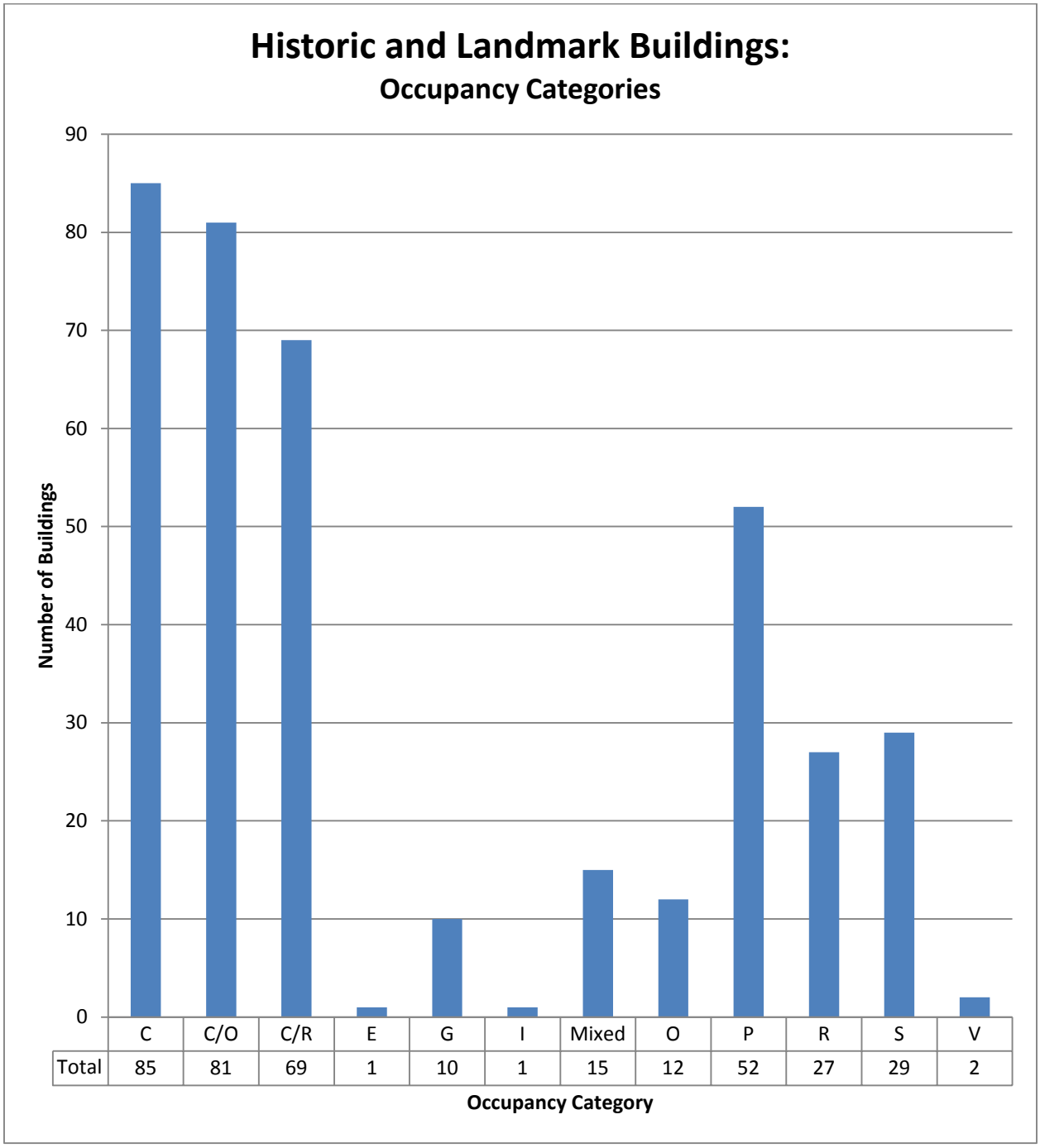


Figure 45 shows the different occupancy types in the buildings classified in the different historical and special review categories.

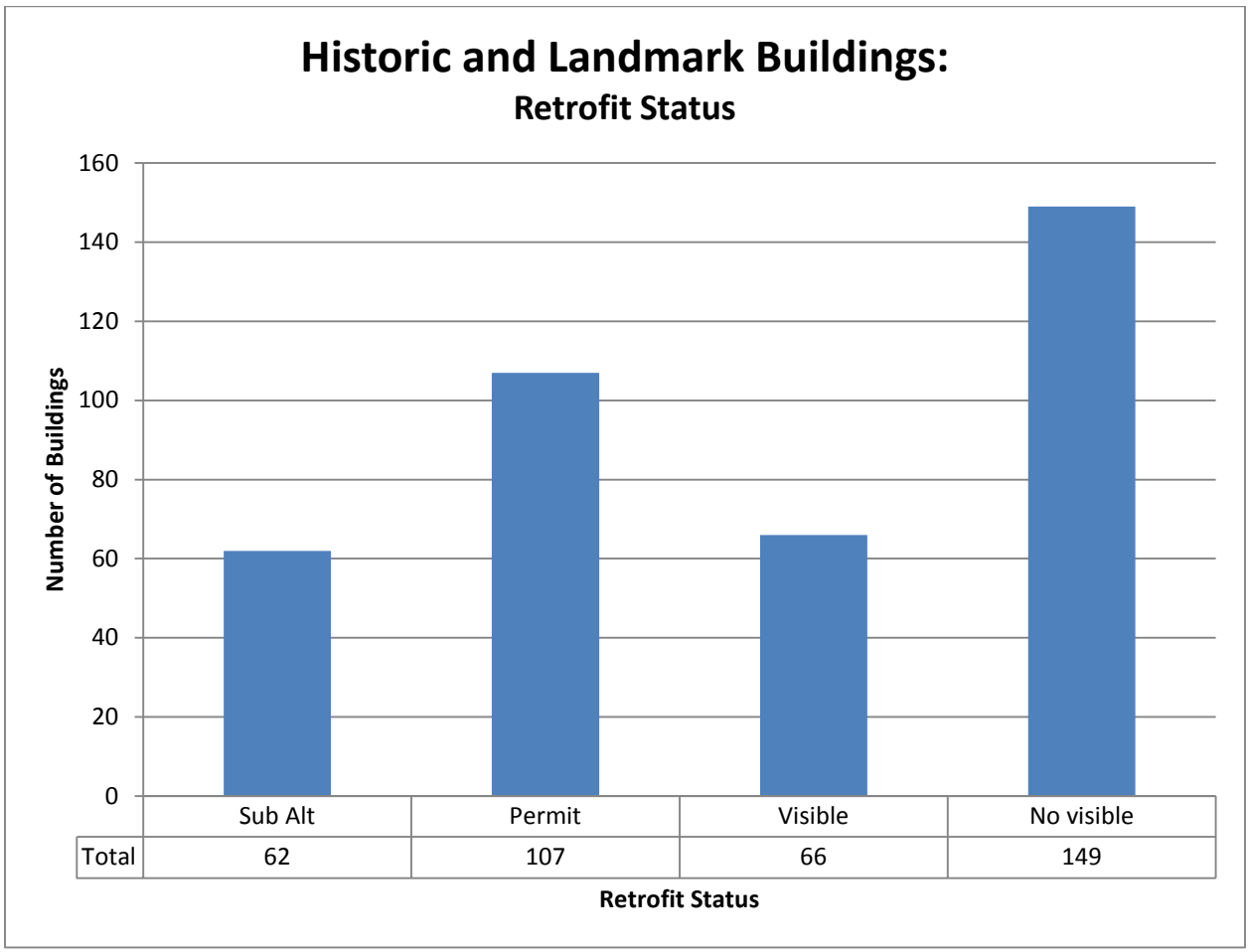
**Figure 45 Historic and Landmark Buildings: Occupancy Categories**




C = Commercial; C/O = Commercial/Office; C/R = Commercial/Residential; E = Emergency; G = Government; I = Industrial; Mixed = Mixed Uses; O = Office; P = Public Assembly; R = Residential; S = Schools; V = Vacant

Figure 46 shows the current retrofit status of the historic buildings.

**Figure 46 Historic and Landmark Buildings: Retrofit Status**



# 6 Technical Information

The final part of the validation process was to determine approximately how many buildings would be able to use the simplified retrofit procedures outlined in the Technical Standard and how many buildings have already been retrofitted and to what level. For the general retrofit status of the buildings on the list, see section 3.4.

## 6.1 Bolts Plus

The Bolts Plus design methodology is based on URM upgrade ordinances passed in California. Buildings that meet a defined set of criteria can be upgraded using a prescriptive method that addresses the most critical deficiencies based on generally observed behavior of URMs subjected to earthquake forces. A building getting a Bolts Plus upgrade will have the following deficiencies addressed. The walls will be tied to the floors and roof to resist out of plane loading (② in Figure 47), the parapets will be braced (①in Figure 47), the diaphragms (the horizontal structural elements at the floor and/or roof) will be tied to the walls to transfer shear loads to the walls (③ in Figure 25), and tall brick walls will be strong backed to prevent out of plane bending failure (④ in Figure 47).

**Figure 47 Retrofit components**

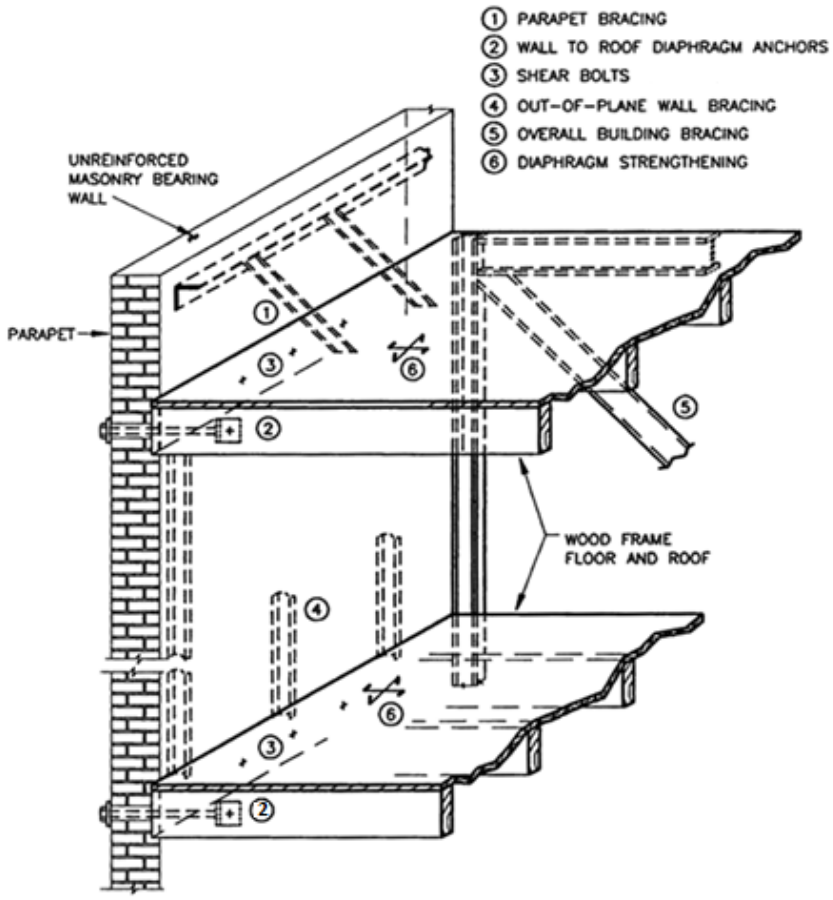



Figure based on http://seblog.strongtie.com/2013/04/seismic-retrofit-of-unreinforced-masonry-urm-buildings/

While the method is “prescriptive,” it still requires that a structural engineer assess the deficiencies in the building, prepare a seismic evaluation report, and analyze the building to determine the required size and spacing of the retrofit components.

### 6.1.1 Bolts Plus Criteria

In order to qualify to use the Bolts Plus method, the building must meet a set of criteria. The building cannot have a “weak story,” meaning that the building needs to have a uniform distribution of masonry wall piers from level to level without one story having substantially fewer wall piers than those above or below it. The mortar strength must be tested as part of the seismic evaluation report and the shear strength has to be greater than 30 psi in order to use the Bolts Plus method. The horizontal shear resisting elements, the diaphragms, must be sheathed with wood or plywood. If the wood sheathing is applied perpendicular to the floor framing members, it is termed “straight” sheathing and it must be covered with wood flooring in order to qualify for the simplified method. The final requirement is the requirement that the building has two qualifying lines of shear resistance in each direction. In order to qualify as lines of shear resistance, a face of the building must have at least 40% of its length made up of piers that have a 2:1 height to width ratio.

### 6.1.2 Bolts Plus, Plus Frame

Buildings that do not meet the criteria for applying the Bolts Plus method can be retrofitted to address the deficiency that does not meet the criteria, and then comply with the requirements of Bolts Plus. The two most common conditions that we see this applying to are diaphragms with straight sheathing boards and buildings that do not have two qualifying lines of shear resisting elements in each direction of the building at each floor.

A large number of buildings on the list have what is termed an “open storefront” at the street level. This is characterized by window walls facing the street that present a structural deficiency due to only one line of resistance in that direction. This deficiency can be addressed by either adding a steel frame, if the open front is required architecturally, or adding shear walls, if some of the openings can be sacrificed. After this second line of resistance is added, the rest of the building can be analyzed using the Bolts Plus method. Since this is a common condition, an additional category was added to determine the number of buildings meeting these requirements. It is anticipated that this type of retrofit has a cost profile between that of Bolts Plus and a full seismic analysis and upgrade.

### 6.1.3 Buildings that qualify

Of the buildings on the URM list, 22% appear to qualify for Bolts Plus and another 34% appear to qualify for Bolts Plus, Plus Frame. The vast majority of the buildings that qualify for Bolts Plus appear to be un-retrofitted, more of the Bolts Plus, Plus Frame have been retrofitted, and about half of those that do not qualify for Bolts Plus have been retrofitted. See Figure 49 through Figure 51.

**Figure 48 Buildings that Qualify for Bolts Plus**

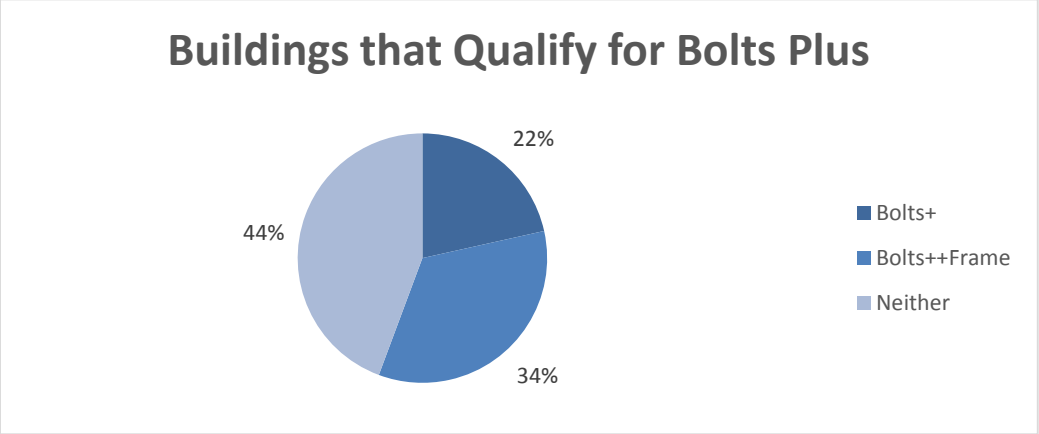
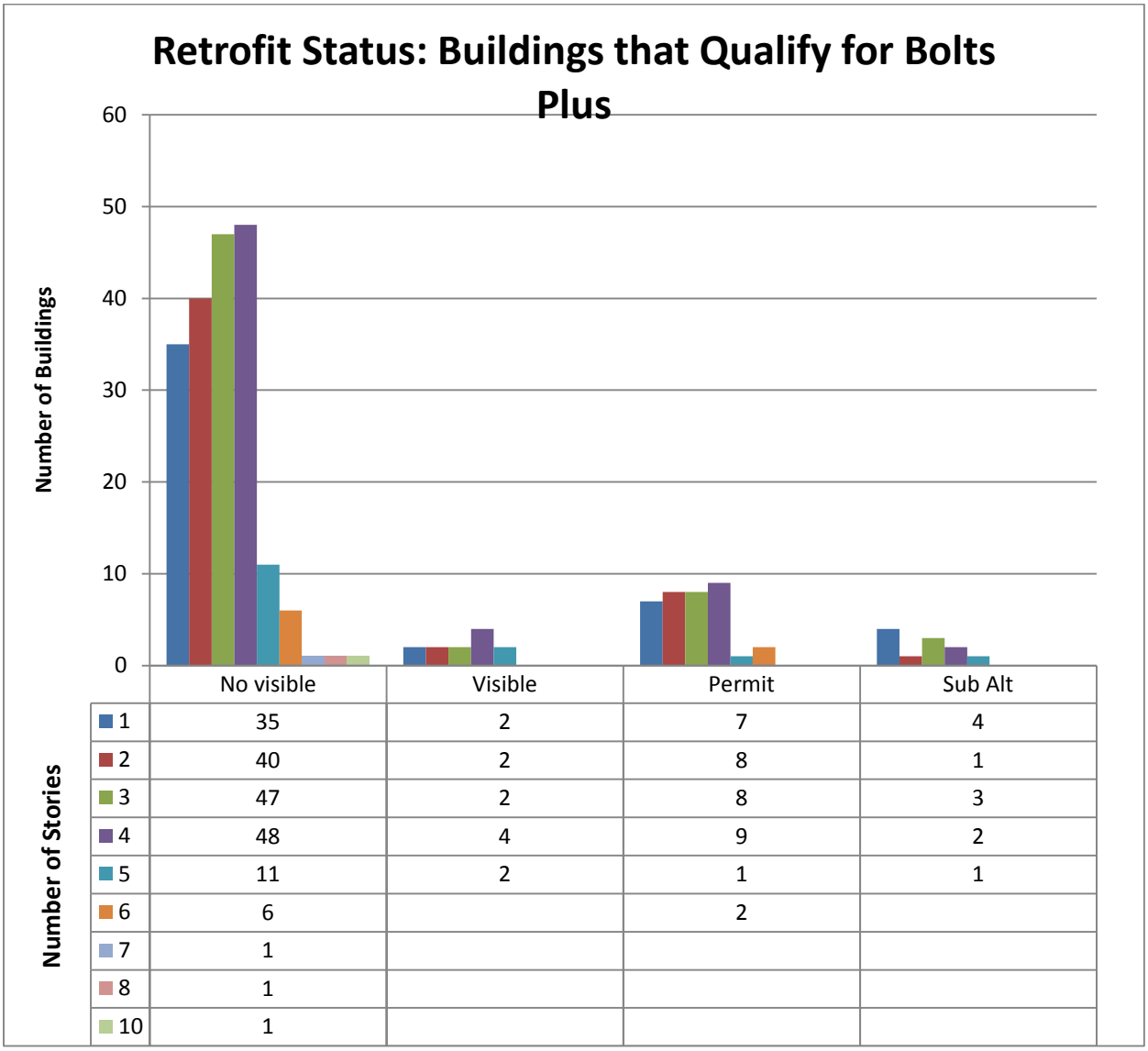



**Figure 49 Retrofit Status: Buildings that Qualify for Bolts Plus**




| Number of Stories | No visible | Visible | Permit | Sub Alt |
|---|---|---|---|---|
| 1 | 35 | 2 | 7 | 4 |
| 2 | 40 | 2 | 8 | 1 |
| 3 | 47 | 2 | 8 | 3 |
| 4 | 48 | 4 | 9 | 2 |
| 5 | 11 | 2 | 1 | 1 |
| 6 | 6 | | 2 | |
| 7 | 1 | | | |
| 8 | 1 | | | |
| 10 | 1 | | | |

**Figure 50 Retrofit Status: Buildings that Qualify for Bolts Plus, Plus Frame**

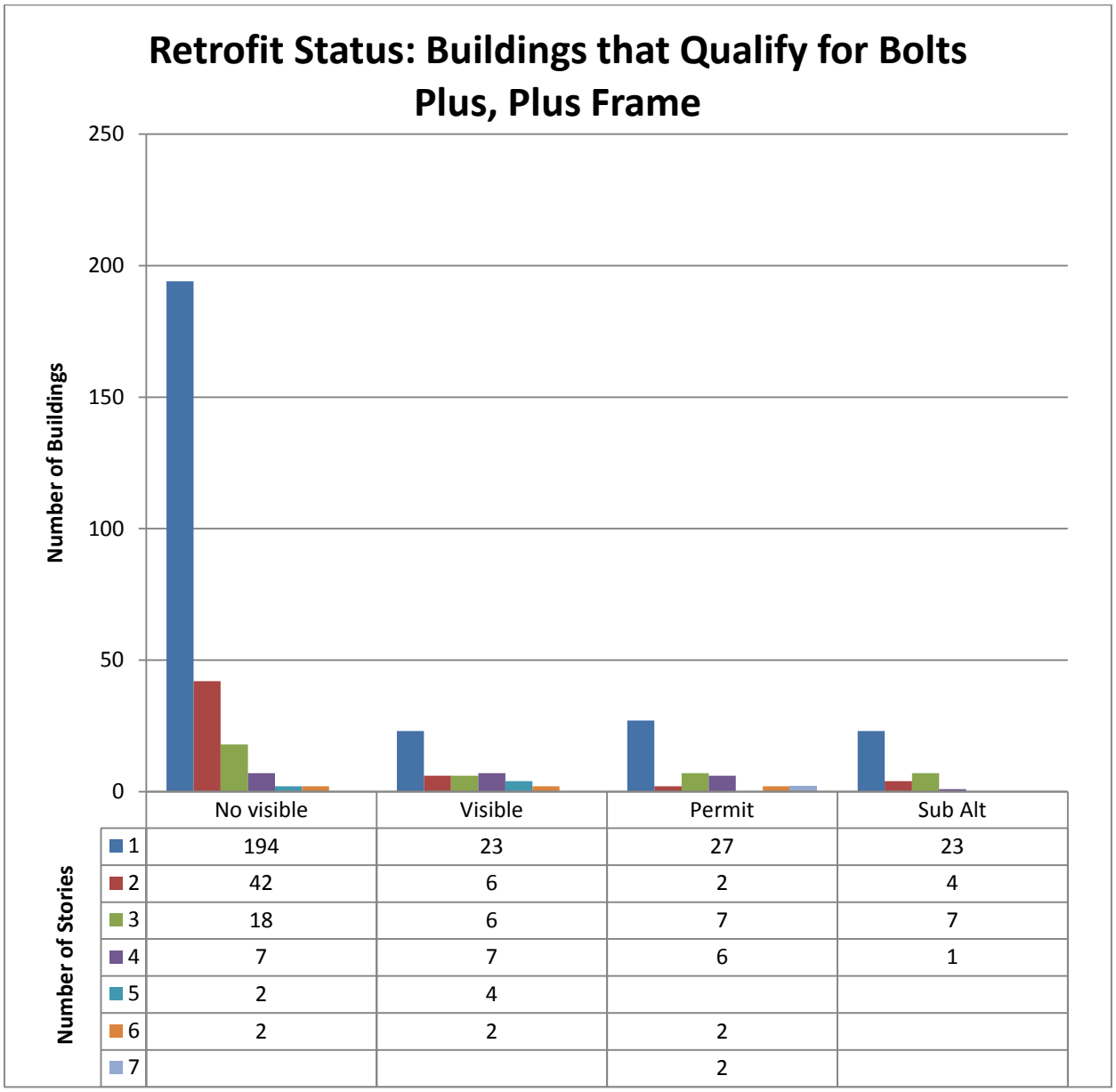
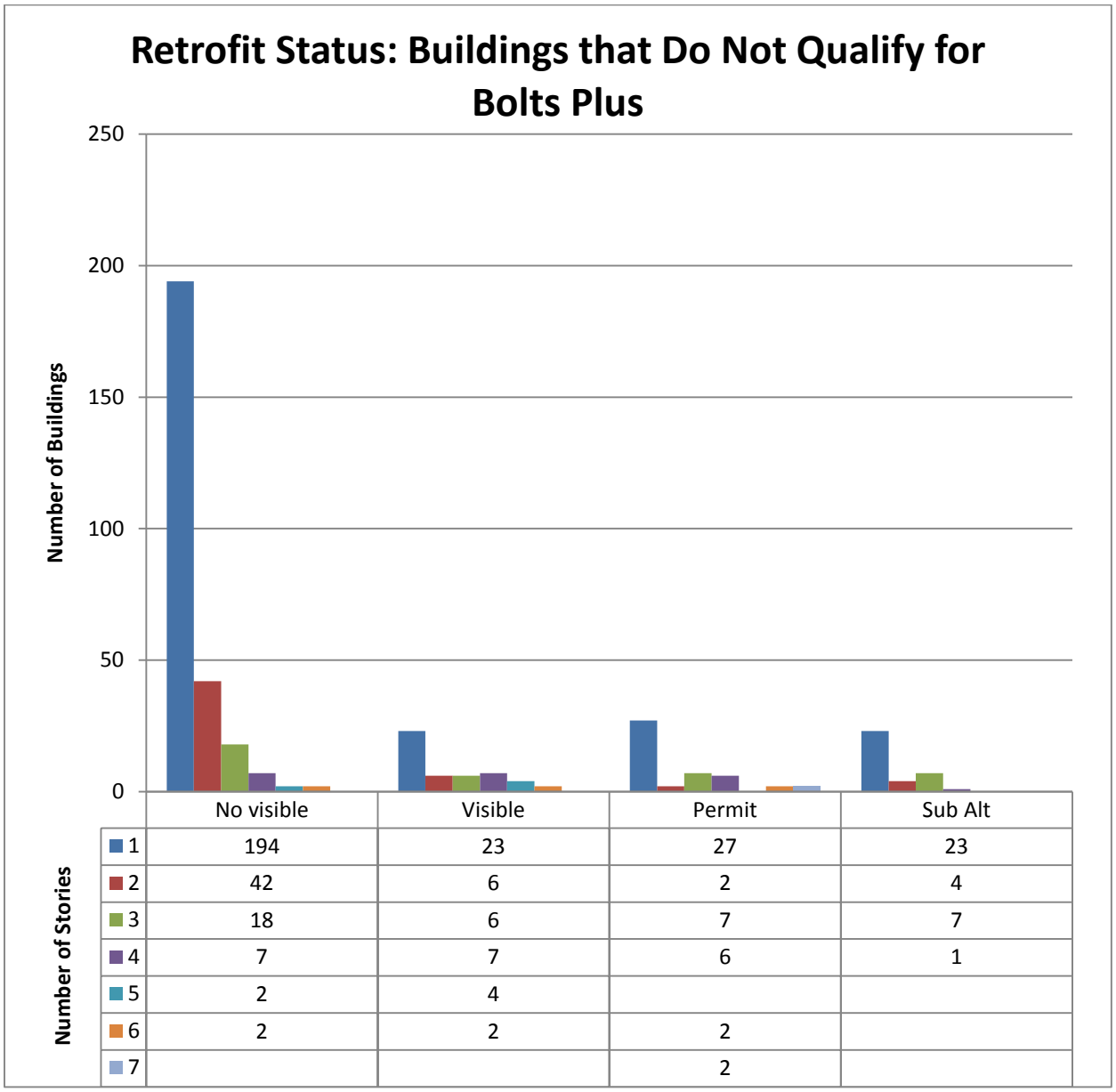


**Figure 51 Retrofit Status: Buildings that Do Not Qualify for Bolts Plus**




| Number of Stories | No visible | Visible | Permit | Sub Alt |
|---|---|---|---|---|
| 1 | 194 | 23 | 27 | 23 |
| 2 | 42 | 6 | 2 | 4 |
| 3 | 18 | 6 | 7 | 7 |
| 4 | 7 | 7 | 6 | 1 |
| 5 | 2 | 4 | | |
| 6 | 2 | 2 | 2 | |
| 7 | | | 2 | |

## 6.2 Rate of Retrofit

There are two different ways to quantify the rate of retrofits. One is using the number of buildings that have been upgraded; the other is comparing the square footages that has been retrofitted. By comparing the rates of retrofit for the number of buildings versus the percentage of buildings, it is apparent that the buildings that have received upgrades tend to be the larger URM buildings. 61% of the buildings have not been retrofit, while only 46% of the square footage has no visible or permitted upgrades. Additionally, there is a higher rate of retrofit across all risk categories for buildings in the downtown neighborhoods (Downtown, Belltown, and Pioneer Square/Chinatown International District) than for buildings outside of the downtown area.

**Table 9 Number of Buildings at Different Retrofit Levels for Each Risk Category: All Buildings**

| Retrofit Status | Critical Risk | High Risk | Medium Risk | Grand Total |
|---|---|---|---|---|
| **No visible** | 21% | 40% | 68% | 61% |
| **Visible** | 4% | 14% | 11% | 11% |
| **Permit** | 55% | 30% | 13% | 18% |
| **Sub Alt** | 21% | 16% | 7% | 10% |
| **Grand Total** | **100%** | **100%** | **100%** | **100%** |

Table 10 Total Square Feet at Different Retrofit Levels for Each Risk Category: All Buildings

| Retrofit Status | Critical Risk | High Risk | Medium Risk | Grand Total |
|---|---|---|---|---|
| **No visible** | 13% | 27% | 59% | 46% |
| **Visible** | 2% | 19% | 14% | 14% |
| **Permit** | 64% | 42% | 18% | 29% |
| **Sub Alt** | 21% | 13% | 9% | 11% |
| **Grand Total** | **100%** | **100%** | **100%** | **100%** |

Table 11 Total Square Feet at Different Retrofit Levels for Each Risk Category: Downtown Area

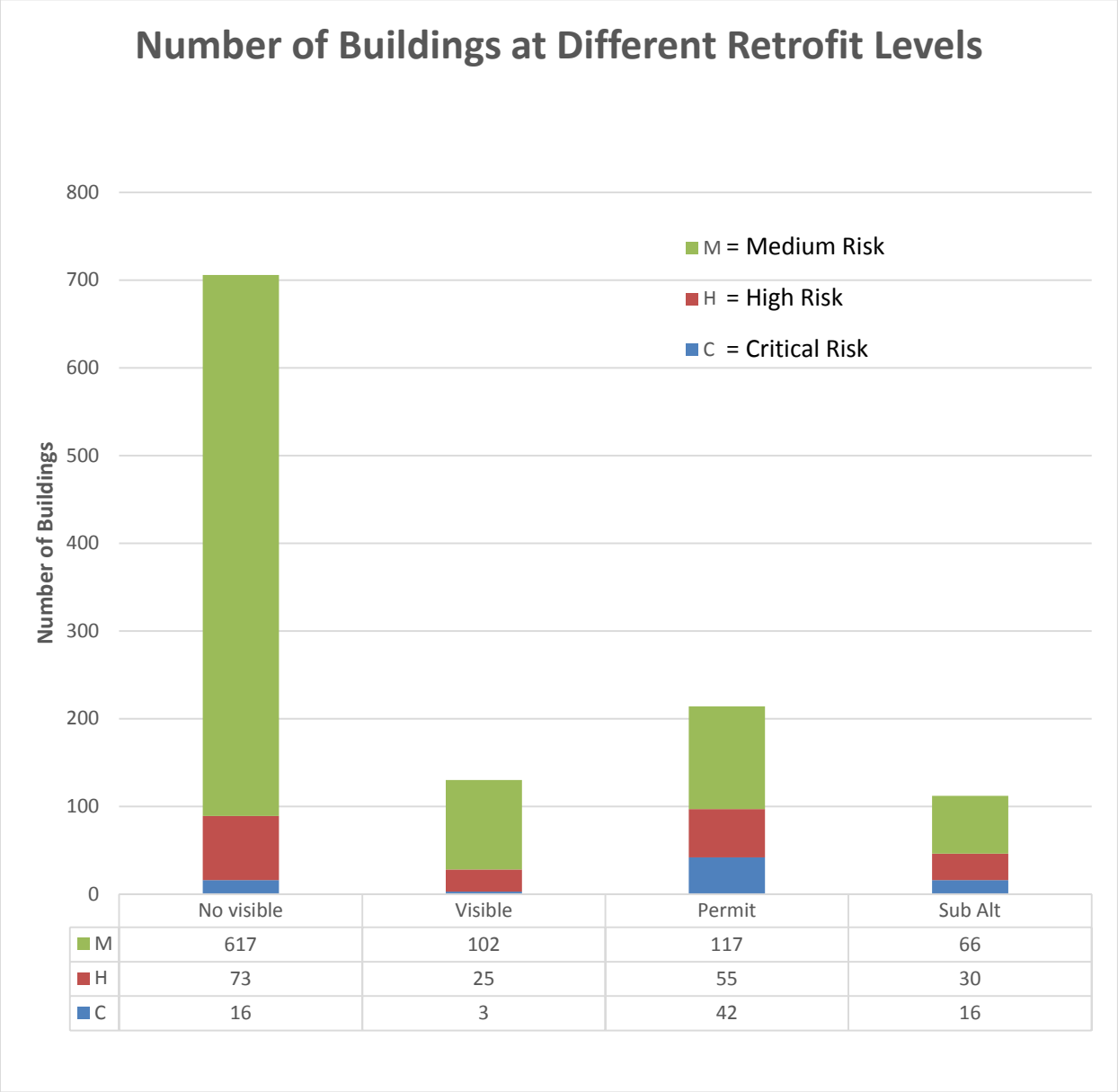
| Retrofit Status | Critical Risk | High Risk | Medium Risk | Grand Total |
|---|---|---|---|---|
| **No visible** | 0% | 17% | 31% | 27% |
| **Visible** | 0% | 47% | 28% | 33% |
| **Permit** | 0% | 29% | 23% | 24% |
| **Sub Alt** | 100% | 7% | 18% | 16% |
| **Grand Total** | **100%** | **100%** | **100%** | **100%** |

The “downtown” area includes Downtown, Belltown, and Pioneer Square/Chinatown International District.

Table 12 Total Square Feet at Different Retrofit Levels for Each Risk Category: Outside Downtown

| Retrofit Status | Critical Risk | High Risk | Medium Risk | Grand Total |
|---|---|---|---|---|
| **No visible** | 13% | 29% | 66% | 50% |
| **Visible** | 2% | 11% | 11% | 10% |
| **Permit** | 65% | 45% | 17% | 30% |
| **Sub Alt** | 20% | 14% | 6% | 10% |
| **Grand Total** | **100%** | **100%** | **100%** | **100%** |

**Figure 52 Number of Buildings at Different Retrofit Levels**

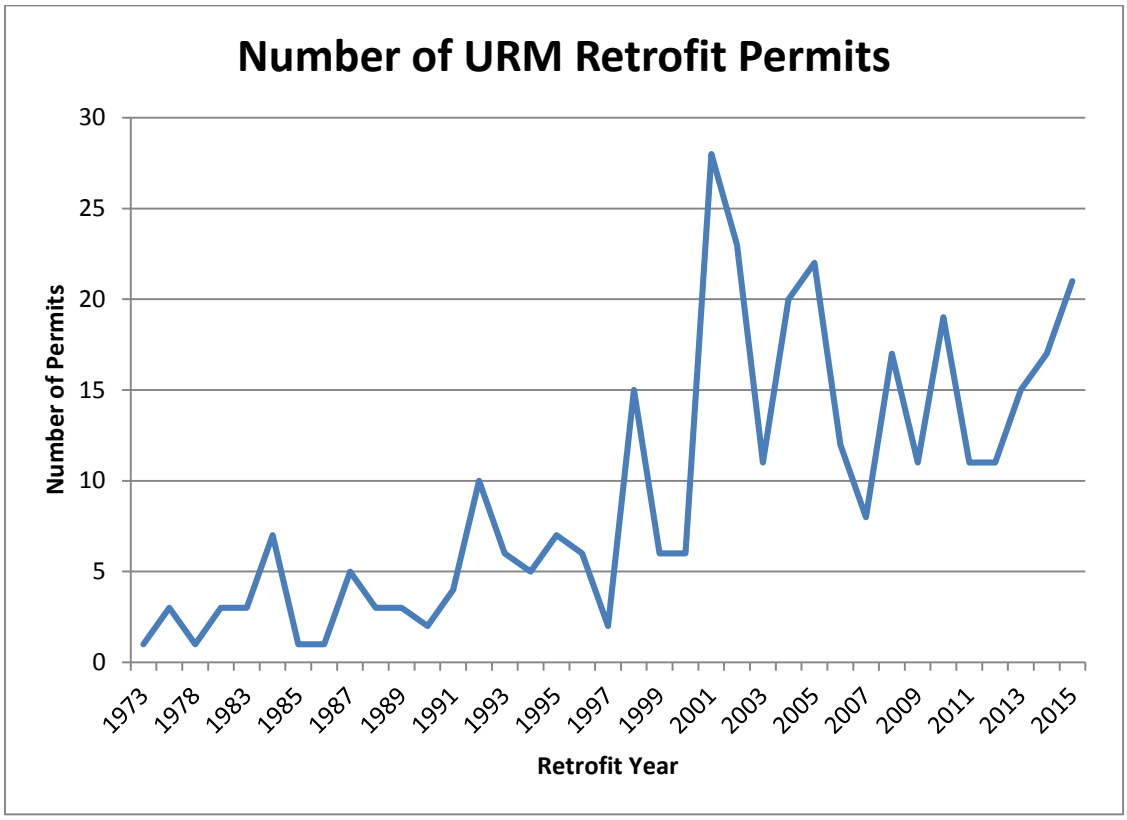



| | No visible | Visible | Permit | Sub Alt |
|---|---|---|---|---|
| M | 617 | 102 | 117 | 66 |
| H | 73 | 25 | 55 | 30 |
| C | 16 | 3 | 42 | 16 |

## 6.3 Age of Retrofits

Figure 53 shows that the rate of permit issuance for seismic retrofits has increased over the last 15 years. The spike in permits in 2001 is due to repairs and retrofits completed after the 2001 Nisqually earthquake. Based on changes to the seismic design codes, Seattle DCI is recommending a benchmark year of 2000 for substantial alterations to qualify to meet the proposed ordinance without any further analysis. Almost all of the substantial alterations included in this data were completed since 2000. Buildings that have undergone voluntary upgrades of any era will be subject to showing that the requirements of the proposed ordinance are met.

**Figure 53 Number of URM Retrofit Permits Each Year**




## 6.4 Bolts Plus versus Substantial Alteration Reviews

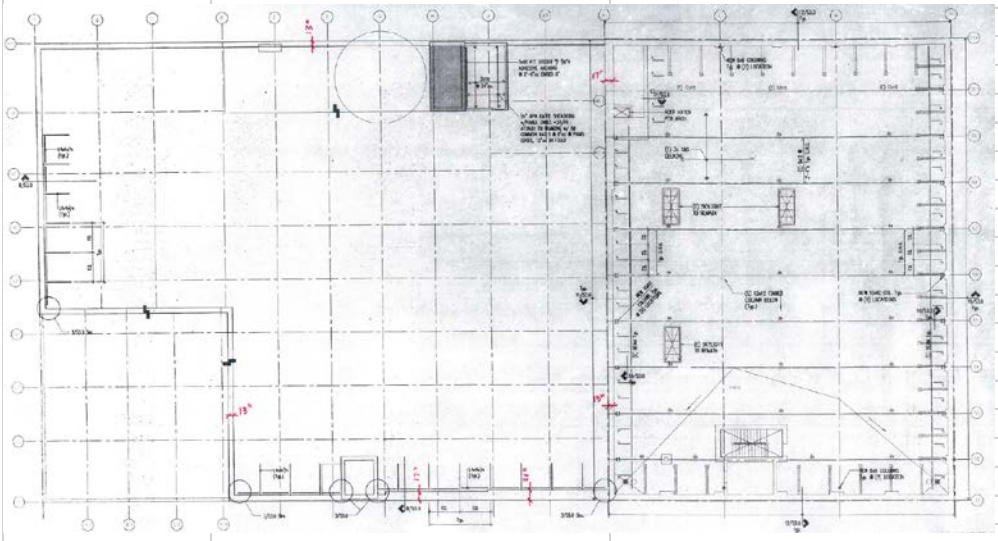
As part of the validation process, a Bolts Plus structural design was carried out for four buildings that have recently undergone substantial alterations and one that had an extensive voluntary retrofit. The purpose of this exercise is to inform a technical group of the differences between what would be required under Bolts Plus and what has been required for substantial alterations. To generally summarize the results, the Bolts Plus requirements are sometimes more stringent for particular elements, but the substantial alterations address the issue more holistically by providing a global lateral system. The comparison charts for each of the buildings investigated are included in Figure 54 through Figure 58. Seattle DCI intends to convene a group of engineers to discuss the results and to potentially adjust the technical standard.

As stated previously, most substantial alterations involve some negotiation between Seattle DCI and the building design team. Most project budgets, especially those for public schools, are not large enough to address all of the deficiencies identified in a seismic evaluation report. The department works with owners to attempt to gain the largest reasonable increase in the seismic safety of the buildings.

## Figure 54 Comparison Chart Bolts Plus and Substantial Alteration: 11 Vine Street

| Comparison of Sub Alt and Bolts+ Solutions | | |
|---|---|---|
| Address: | 11 Vine St | |
| Building Description: | The building is a 3 level storage warehouse approximately 120'x150'. It has had several renovations and additions through the years and has a variety of floor levels. The site slopes down toward the west with 1-1/2 stories above grade on the east side and 3 stories exposed on the west side. The building shares a party wall with 2501 Elliott Ave, another URM. The framing is predominantly 12x16 beams at an approximately 14' spacing with 4x12 at 24"OC. This framing is topped by 3x T&G decking. The exterior walls vary between two and four wythe brick masonry. | |

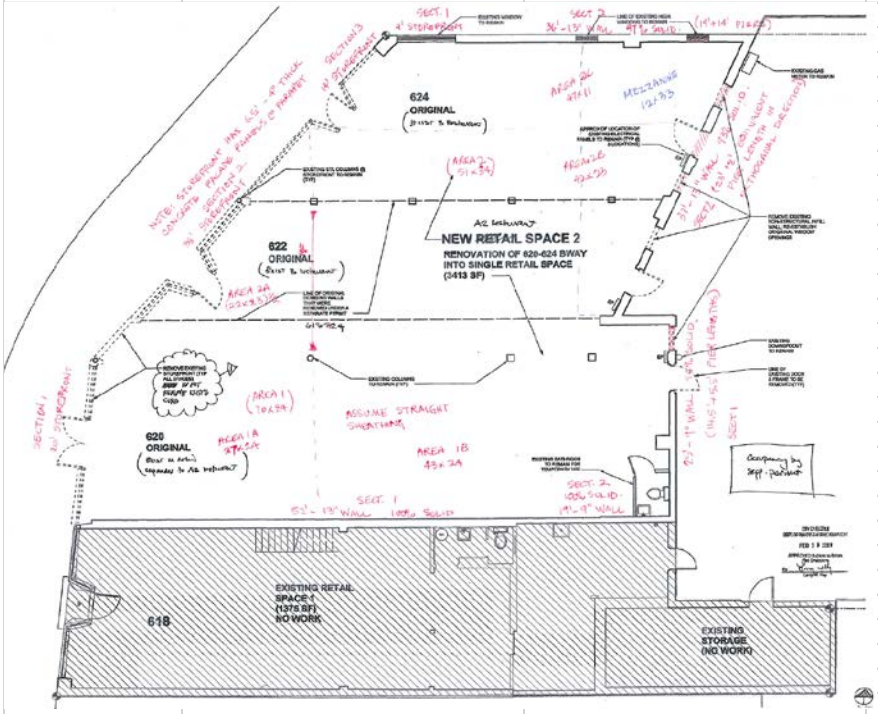
| ***Item*** | ***Substantial Alteration*** | ***Bolts +*** |
|---|---|---|
| ***Seismic Force Level*** | FEMA 178 $A_v$ = 0.3 $A_a$ = 0.3 (12/2004) | 75% 2012 IBC Deisgn Values |
| Out of Plane Wall Ties | All Levels: Z4 CT/T2 26-6 tension ties with thru wall bolt and bearing plate at 6' OC except 4' OC at party wall | HTT4 with 5/8" dia through bolt with 5-1/2" square bearing plate<br>Roof: @ 6' OC<br>3rd Level: @ 4' OC<br>2nd Level: @ 5' OC |
| Out of Plane Wall Strengthening | No out of plane strengthening required | 3-1/2"x9-1/2" PSL at 9' OC as strongback. Strongbacking required for all walls at top floor and for 18' tall three wythe walls at the 2nd level |
| Diaphragm | No diapghragm work required | Strengthen diaphragms at all levels: 19/32" Struct I sheathing with 2 lines of staples (7/16" crown, 2" penetration) @ 2-1/2" OC at diaphragm boundary, 4" OC at other panel edges, and 12" OC at field |
| Shear Walls/Moment Frame | Shear walls (crosswalls?) added in east-west direction at all levels (7 locations). No walls added in north-south direction. | No shear walls or crosswalls added. |
| Shear Transfer Bolts | 5/8" dia adhesive anchors at 12" OC (anchor testing required) | 5/8" dia adhesive anchors at 12" OC (anchor testing required) |
| Parapets | Continuous L4x4x1/4 located 1' from top of parapet. L4x4x1/4 braces at 8' OC at west wall and western section of north wall | *Parapet brace design not complete* . Braces at 6' OC all around perimeter |



## Figure 55 Comparison Chart Bolts Plus and Voluntary Upgrade: 618 Broadway E

| Comparison of Sub Alt and Bolts+ Solutions | | |
|---|---|---|
| Address: | 618 Broadway E | |
| Building Description: | This building is a one story, 72'x80', irregularly shaped commercial building. The south 20' retail space was not included in the substantial alteration and was also excluded from the Bolts Plus solution. (The south 20' appears to be an addition from the 1930's.) The ceiling height is approximately 13'. The exterior walls are URM on three sides. The west wall of the building is a storefront system with a tall concrete facade/parapet. The roof consists of 2x framing with 2x T&G sheathing. The sheathing is assumed to be straight sheathing with roofing directly applied to the sheathing. Site Class D was selected for the design as the default value. | |

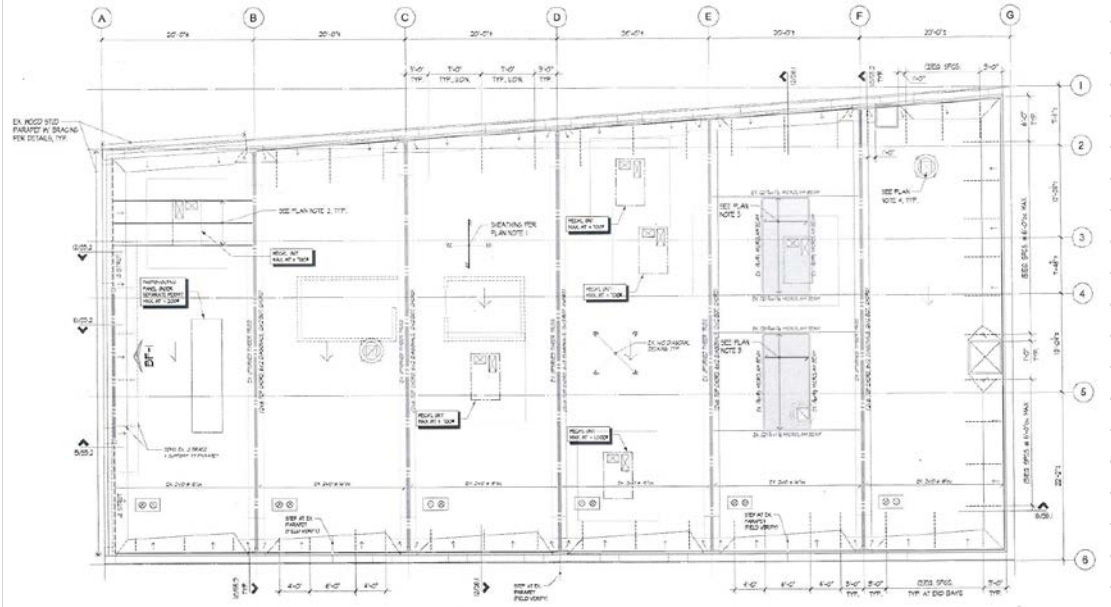
| ***Item*** | ***Voluntary Upgrade*** | ***Bolts +*** |
|---|---|---|
| ***Seismic Force Level*** | FEMA 178 $A_v$ = 0.2 (2/2008) | 75% 2012 IBC Deisgn Values |
| Out of Plane Wall Ties | LTT19 at 32" to 48" OC with 5/8" dia through bolt and 3x3x3/16" bearing plate | LTT19 with 1/2" dia through bolt with 5-1/2" square bearing plate at 32" OC at three wythe walls and 48" OC at two wythe walls. Alternatively, test existing joist anchors to a load of 1570 lbs; anchors still required where joists are parallel to walls. |
| Out of Plane Wall Strengthening | Not required | 1-3/4x7-1/4 LVL at 6' OC attached to roof, slab and mid height of wall |
| Diaphragm | 1/2" CDX over existing sheathing with 10d nails at 6" OC at panel edges 12" OC at field (DEFERRED) | 1/2" CDX over existing sheathing with 10d nails at 6" OC at panel edges 12" OC at field |
| Shear Walls/Moment Frame | W14x38 columns and beam<br>7'x7'x1'6" footing with 1'-6" deep keys each side<br>3x14 drag strut | *Moment frame design not complete.* |
| Shear Transfer Bolts | 5/8" dia through bolts or epoxy bolts at 32" OC | 5/8" dia bolts in epoxy screen tubes at 32" OC (anchor testing required) |
| Parapets | L2x2x1/2 at 48" OC bolted to existing roof joist with (1) 5/8" dia through bolt. 1/2" dia through bolt with 3x3x3/16 bearing plate as attachment to URM parapet. | 2x4 #2 HF Connected to transfer inward and outward forces to the existing structure. 5/8" dia epoxy anchors at 48" OC (anchor testing required) |



## Figure 56 Comparison Chart Bolts Plus and Substantial Alteration: 1002 E Seneca St

| Comparison of Sub Alt and Bolts+ Solutions | | |
|---|---|---|
| Address: | 1002 E Seneca St | |
| Building Description: | This building is a one story URM with a concrete daylight basement. The bolts plus analysis treats the building as a one story building. The building is slightly trapezoidal 55' to 63' x 120'. The roof is heavy wood trusses at 20' OC with 2x10 joists @16" OC with 1x diagonal sheathing. The walls are 3 wythe brick masonry while the parapets are two wythes. The south wall parapet is wood frame, all other parapets are URM. The south wall is an open storefront, the west wall has several window and door openings yielding about 20% solid piers, the north wall is solid, and the east wall has a few small openings. | |

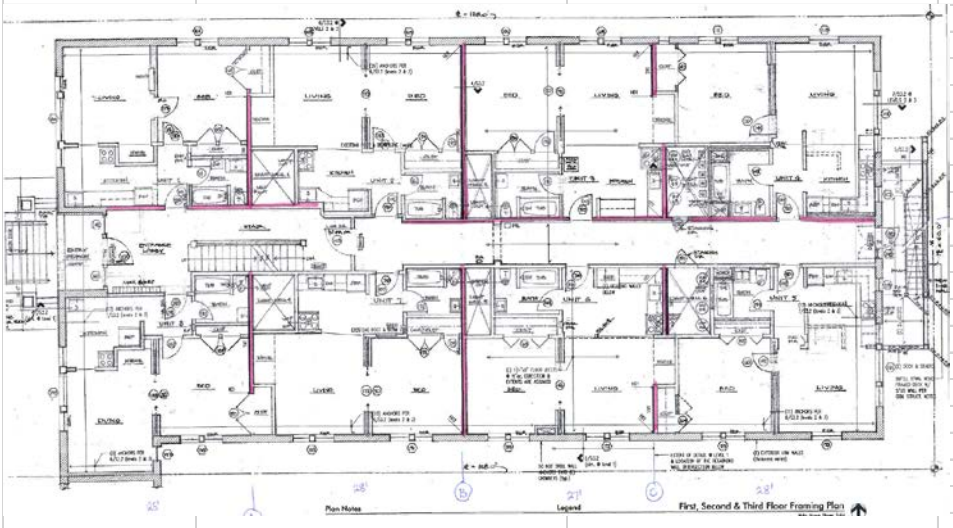
| ***Item*** | ***Substantial Alteration*** | ***Bolts +*** |
|---|---|---|
| ***Seismic Force Level*** | ASCE 31-03 $S_S$=0.64 $S_1$=0.24 (10/2014) | 75% 2012 IBC Deisgn Values |
| Out of Plane Wall Ties: Roof | LTT19 at 32" OC with 3/4" dia epoxy anchor | LTT19 at 32" OC with 1/2" dia through bolts with 5-1/2" square bearing plate |
| Out of Plane Wall Strengthening | Strongbacking with (2) 4" metal studs @ 24" OC at all URM walls | Strongbacking with 3-1/2"x7-1/4" LSL (1.3E) @ 6' OC at all URM walls |
| Diaphragm: Roof | 1/2" CDX over existing diagonal sheathing with 10d nails at 4" OC at panel edges 12" OC at field. | No diaphragm strengthening required |
| Shear Walls and Braced Frame | New braced frame at south wall with HSS 5x5x1/2 columns, HSS 4x4x1/2 inverted V braces, and W 12x26 beam.<br>Infill at west wall included in pier lengths to reduce shear stress on west wall. | *Braced frame design not complete.*<br>The west wall has openings that are being infilled which will make it meet the 40% requirement. |
| Shear Transfer Bolts | 3/4" dia epoxy grouted bolts at 32" OC at east and west walls | 5/8" dia epoxy grouted bolts at 32" OC at north and south walls and 16" OC at east and west walls (anchor testing required) |
| Parapets | L 3x3x1/4 braces at 7' OC with (3) 3/4" dia epoxy anchors per brace | *Parapet brace design not complete* . |



## Figure 57 Comparison Chart Bolts Plus and Substantial Alteration: 1626 13th Ave

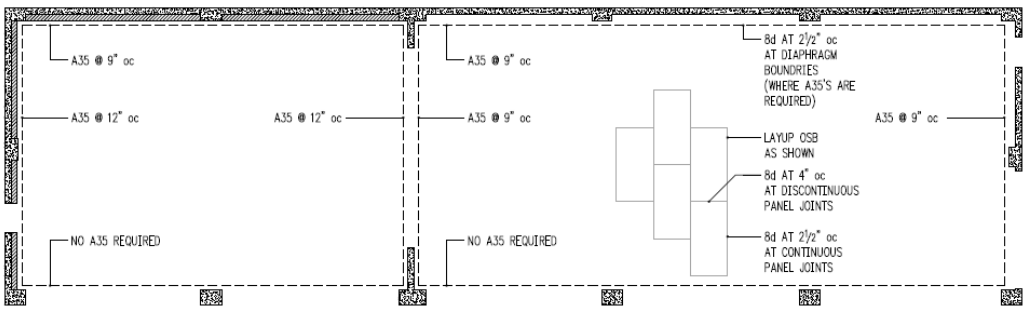
| Comparison of Sub Alt and Bolts+ Solutions | | |
|---|---|---|
| Address: | 1626 13th Ave | |
| Building Description: | This building is a three story, 54'x109', apartment building. The ceiling height is approximately 9' 4" on each floor. The exterior walls are all URM, three wythes on the upper two floors and four wythe at the first floor, however the north and west walls have a veneer course over two or three wythes of URM. The roof slopes down to the east starting at the top of the cornice at the west wall and ending at the top of the wall on the east side. The top of the north parapet is at the same elevation as the cornice on the west wall. The south parapet steps down. The roof consists of 2x8 framing spanning between the interior walls. The ceiling framing is also 2x8. The floor framing is 2x10. The roof diaphragm is assumed to consist of straight sheathing with roofing applied directly to the sheathing. The floors are assumed to be straight sheathing with wood flooring over. Site Class C was selected for the design. | |

| ***Item*** | ***Substantial Alteration*** | ***Bolts +*** |
|---|---|---|
| ***Seismic Force Level*** | SEBC 2012 $S_S$ = 1.35 $S_1$ = 0.52 (2/2015) | 75% 2012 IBC Deisgn Values |
| Out of Plane Wall Ties: Roof | LTTI31 at 48" OC with 3/4" dia epoxy anchor | LTTI31 at 32" OC with 5/8" dia through bolt and 5-1/2" square bearing plate |
| Out of Plane Wall Ties: Floors | LTT20B at 48" OC with 3/4" dia epoxy anchor | LTT20B at 32" OC with 5/8" dia through bolt and 5-1/2" square bearing plate |
| Out of Plane Wall Strengthening | Not required | Not required |
| Diaphragm | 1/2" CDX over existing straight sheathing with 10d nails at 6" OC at panel edges 12" OC at field. Infill skylights and sheath per notes. | No diaphragm strengthening required. |
| Shear Walls | New shear walls for loads in transverse direction including plywood sheathing and hold down hardware all levels. (At locations of crosswalls shown for transverse loading. No added shear walls for longitudinal loading.) | No shear wall strengthening required. Existing crosswalls adequate. |
| Shear Transfer Bolts | No added shear transfer bolts are shown. | 5.8" ø epoxy bolts at 48" OC at roof and 12" OC at floors on north and south walls, 36" OC at east and west walls. (Anchor testing required.) |
| Parapets | (2) 2x4 braces at 48" OC with A34 each side, top and bottom. 3/4" dia epoxy anchor at 48" OC. | 2x4 braces at 64" OC. 5/8" dia epoxy anchors at 64"OC. |



## Figure 58 Comparison Chart Bolts Plus and Substantial Alteration: 1728 4th Ave.

| Comparison of Sub Alt and Bolts+ Solutions | | |
|---|---|---|
| Address: | 1728 4th Ave S | |
| Building Description: | This building is a one story, 30'x103', former garage building. It is approximately 13' high. The exterior walls are a mix of URM and CMU. There is a negligible parapet. The roof consists of 8"x16" wood purlins at 5' OC with 2x straight sheathing forming the roof surface. The east wall has one door opening, the west wall has a window and a storefront door and window system, the south wall is solid, and the north wall contains five 18' garage door openings. The project involved converting the space to retail, so two of the five garage doors were being framed in. The site is located in a liquefaction zone, so Site Class E was selected for the design. | |
| ***Item*** | ***Substantial Alteration*** | ***Bolts +*** |
| ***Seismic Force Level*** | ASCE 41-13 $S_S$ = 1.491 $S_1$ = 0.506 (5/2015) | 75% 2012 IBC Deisgn Values |
| Out of Plane Wall Ties | HDU2 at each roof purlin with 5/8" ø through bolt and 4"x4" bearing plate. | DTT2Z-SDS2.5 at each roof purlin with 1/2" ø through bolt with 5-1/2" square bearing plate. |
| Out of Plane Wall Strengthening | 1-3/4" x 7-1/4" LVL studs at 16" OC attached to the walls with 3/4" ø epoxy bolts at 4' OC grid; top and bottom plate attached to slab and concrete edge beam. | 1-3/4" x 7-1/4" LVL strongbacks at 6' OC; connect to wall at mid-height with 1/2" ø through bolt with 5-1/2"x5-1'2" square bearing plate. |
| Diaphragm | 1/2" OSB over existing straight sheathing with 8d nails at 2-1/2" OC at continuous panel edges and diaphragm boundary and 4" OC at discontinuous panel edges. | 15/32" Rated Sheathing over existing straight sheathing with 8d nails at 6" OC at panel edges and 12" OC at field. |
| Shear Walls | A35 clips to transfer loads from diaphragm to shear walls. (Designer found open front to be acceptable without added shear element.) | New shear walls at north wall to provide two lines of resistance in east-west direction. 36' total length (2-18' sections) with 15/32" rated sheathing w/ 8d nails at 4" OC at panel edges and 12" OC at field. HTT5 hold down anchors with SB24 anchor bolts to new footing. |
| Shear Transfer Bolts | 3/4" ø epoxy bolts at 12" OC. | 5/8" ø epoxy bolts at 32" OC at East and West Walls, 72" OC at North and South Walls (anchor testing requied) |



# 7 Appendices

## 7.1 Appendix A: Definitions

The definitions marked with an asterisk are specific to this report and Seattle's proposed URM retrofit program.

***Frame*** a structural element made up of beams and columns. Braced frames also contain brace (diagonal) elements, and moment frames are made up of just beams and columns with connections that resist sideways loads.

***Header Course*** a row of bricks placed perpendicular to the other bricks that are used to connect two wythes together. It is characterized by the appearance of ends of bricks (shorter than the sides of the bricks) every 5 to 6 rows.

***Historic District*** is an area designated by the National Register of Historic Places as an area that has buildings and sites that have special historical significance. The area has special development guidelines to protect the historic character of the area.

***Landmark*** a building or structure that has been designated for preservation by the City Landmarks Preservation Board, has been designated for preservation by the State of Washington or has been listed or determined eligible to be listed in the National Register of Historic Places. These buildings are subject to a requirement to obtain a certificate of approval before making a change to the external and/or the internal appearance of the structure.

***Landmark District*** is an area similar to a Historic District.

****Public Assembly*** an occupancy group characterized by more than 100 people in one space.

****Risk Category*** is a classification assigned to each building based on the height of the building, the occupancy, and the soil conditions.

- ***Critical Risk** is assigned to buildings in the Emergency and Schools occupancy groups.
- ***High Risk** is assigned to buildings over three stories in poor soil areas (liquefaction and slide areas) and buildings in the public assembly group with occupancies more than 100 people.
- ***Medium Risk** is assigned to all other buildings.

***Rosette*** is a large washer-like element on the exterior of a brick building used to transfer the load from the bolt to the bricks. The rosettes are generally about 5" round or square.

***Special Review District*** is an area that has special review guidelines to maintain the character of an area.

***Substantial Alteration*** is a Seattle Existing Building Code (SEBC) term for a significant, code specified level of upgrade. When a URM is substantially altered, it undergoes a seismic evaluation that identifies its deficiencies. Ideally, all of the deficiencies are addressed to resist the seismic forces at the Collapse Prevention performance level. The triggers for a substantial alteration are per 2012 SEBC, and are further described in Seattle DCI Tip 314, Seattle Building Code Requirements for Existing Buildings that Undergo Substantial Alterations included in Appendix B.

*__URM__ an unreinforced masonry building with at least one bearing wall subject to the proposed ordinance. For the purposes of the URM upgrade ordinance, URM does not include concrete masonry (concrete block) buildings.

__Wythe__ a vertical section of bricks one unit thick. Most URM walls are made up of multiple wythes of masonry.

## 7.2 Appendix B: Seattle DCI Tip 314: Seattle Building Code Requirements for Existing Buildings that Undergo Substantial Alteration

Seattle DCI Tip 314 describes the process and triggers for substantial alteration. The tip can be found at the following link:

http://www.seattle.gov/DPD/Publications/CAM/cam314.pdf

## 7.3 Appendix C: Descriptions of Previous Studies

### 7.3.1 1974 Seattle Department of Buildings:

This work was done to estimate the cost of adding seismic floor and roof ties to the Pioneer Square area buildings.

### 7.3.2 1993 Seismically Suspect Building Survey

No information on the survey, just a list of buildings with building type and FEMA score.

### 7.3.3 1993 Preuss:

Jane Preuss did a building inventory of First Hill, Wallingford, Columbia City and Lake City. These buildings were roughly mapped and were matched to our database.

### 7.3.4 1994 Cynthia Hoover Survey

Cynthia Hoover worked with the Seattle DCI building inspectors and engineers on a training exercise funded by an Earthquake Engineering Research Institute (EERI) grant. She led the inspectors and engineers in the use of ATC-20 for post-earthquake inspections. They used the rapid evaluation safety assessment forms in targeted neighborhoods to practice building identification. Pairs of district building inspectors visited areas of Capitol Hill, Columbia City, First Hill, and Wallingford/Fremont. The work was done by both drive by and sidewalk surveys.

### 7.3.5 1995 EQE City Facility Study

EQE studied 78 municipal facilities to assess the structural and nonstructural risks in these city-owned facilities. Five of the buildings they studied were indicated to be URM.

### 7.3.6 2001 Reid Middleton Study

Reid Middleton assessed buildings in Ballard, Pioneer Square, and the Chinatown-International District after the 2001 Nisqually earthquake. They used the FEMA methodologies to screen the buildings. Their survey focused on all building types.

### 7.3.7 2007 Reid Middleton Study

The 2007 Reid Middleton Study consolidated data from the 1994 Cynthia Hoover Survey, the 1995 EQE City Facility Study, and the 2001 Reid Middleton Study. The study consisted of field surveys in the following selected neighborhoods: West Seattle, Capitol Hill, Northgate, Bitter Lake, Downtown, University District, and Roosevelt. The survey was conducted by driving around the target neighborhoods, particularly the commercial cores, looking for header courses, brick sills, arched window headers, and wall anchors. The locations identified were then compared against KCA records and those that were built before 1940 were added to the list.

### 7.3.8 2009 DPD (SDCI)

Seattle DCI structural plans engineers conducted Virtual Earth tours of selected Kroll Map pages followed by drive bys in Ballard, Capitol Hill, Cascade, Central District, Columbia City, Crown Hill, Georgetown, Greenwood, Green Lake, Lake City, Montlake, Madrona, Queen Anne, Ravenna, SODO, University District, Wallingford, Fremont, and West Seattle. Buildings were added to the list based on similar criteria to the 2007 Reid Middleton Study.

### 7.3.9 2012 DPD (SDCI)

Additional Virtual Earth tours of the rest of the Kroll Map pages followed by drive bys. This study focused on Capitol Hill, Cascade, Downtown, First Hill, Pioneer Square, Chinatown-International District, Queen Anne, and Belltown.

## 7.4 Appendix D: FEMA 154 Occupancy Categories and Loads

## Rapid Visual Screening of Buildings for Potential Seismic Hazards
A Handbook

*FEMA 154, Edition 2 / March 2002*

**3.5 Determining and Documenting Occupancy** Two sets of information are needed relative to occupancy: (1) building use, and (2) estimated number of persons occupying the building.

***3.5.1 Occupancy***

Occupancy-related information is indicated by circling the appropriate information in the left center portion of the form (see Figure 3-5). The occupancy of a building refers to its use, whereas the occupancy load is the number of people in the building (see Section 3.5.2). Although usually not bearing directly on the structural hazard or probability of sustaining major damage, the occupancy of a building is of interest and use when determining priorities for mitigation.

Nine general occupancy classes that are easy to recognize have been defined. They are listed on the form as Assembly, Commercial, Emergency Services (Emer. Services), Government (Govt), Historic, Industrial, Office, Residential, School buildings. These are the same classes used in the first edition of FEMA 154. They have been retained in this edition for consistency, they are easily identifiable from the street, they generally represent the broad spectrum of building uses in the United States, and they are similar to the occupancy categories in the *Uniform Building Code* (ICBO, 1997).

The occupancy class that best describes the building being evaluated should be circled on the form. If there are several types of uses in the building, such as commercial and residential, both should be circled. The actual use of the building may be written in the upper right hand portion of the form. For example, one might indicate that the building is a post office or a library on the line titled “use” in the upper right of the form (see Figure 3-2). In both of these cases, one would also circle “Govt”. If none of the defined classes seem to fit the building, indicate the use in the upper right portion of the form (the building identification area) or include an explanation in the comments section. The nine occupancy classes are described below (with general indications of occupancy load):

• ***Assembly***. Places of public assembly are those where 300 or more people might be gathered in one room at the same time. Examples are theaters, auditoriums, community centers, performance halls, and churches. (Occupancy load varies greatly and can be as much as 1person per 10 sq. ft. of floor area, depending primarily on the condition of the seating—fixed versus moveable).

• ***Commercial***. The commercial occupancy class refers to retail and wholesale businesses, financial institutions, restaurants, parking structures and light warehouses. (Occupancy load; use 1 person per 50 to 200 sq. ft.).

• ***Emergency Services.*** The emergency services class is defined as any facility that would likely be needed in a major catastrophe. These include police and fire stations, hospitals, and communications centers. (Occupancy load is typically 1 person per 100 sq. ft.).

• ***Government.*** This class includes local, state and federal non-emergency related buildings (Occupancy load varies; use 1 person per 100 to 200 sq. ft.).

• ***Historic.*** This class will vary from community to community. It is included because historic buildings may be subjected to specific ordinances and codes.

• ***Industrial.*** Included in the industrial occupancy class are factories, assembly plants, large warehouses and heavy manufacturing facilities. (Typically, use 1 person per 200 sq.ft. except warehouses, which are perhaps 1person per 500 sq. ft.).

• ***Office.*** Typical office buildings house clerical and management occupancies (use 1 person per 100 to 200 sq. ft.).

• ***Residential.*** This occupancy class refers to residential buildings such as houses, townhouses, dormitories, motels, hotels, apartments and condominiums, and residences for the aged or disabled. (The number of persons for residential occupancies varies from about 1 person per 300 sq. ft. of floor area in dwellings, to perhaps 1 person per 200 sq. ft. in hotels and apartments, to 1 per 100 sq. ft. in dormitories).

• ***School.*** This occupancy class includes all public and private educational facilities from nursery school to university level (Occupancy load varies; use 1 person per 50 to 100 sq. ft.).

When occupancy is used by a community as a basis for setting priorities for hazard mitigation purposes, the upgrade of emergency services buildings is often of highest priority. Some communities may have special design criteria governing buildings for emergency services. This information may be used to add a special Score Modifier to increase the score for specially designed emergency buildings.

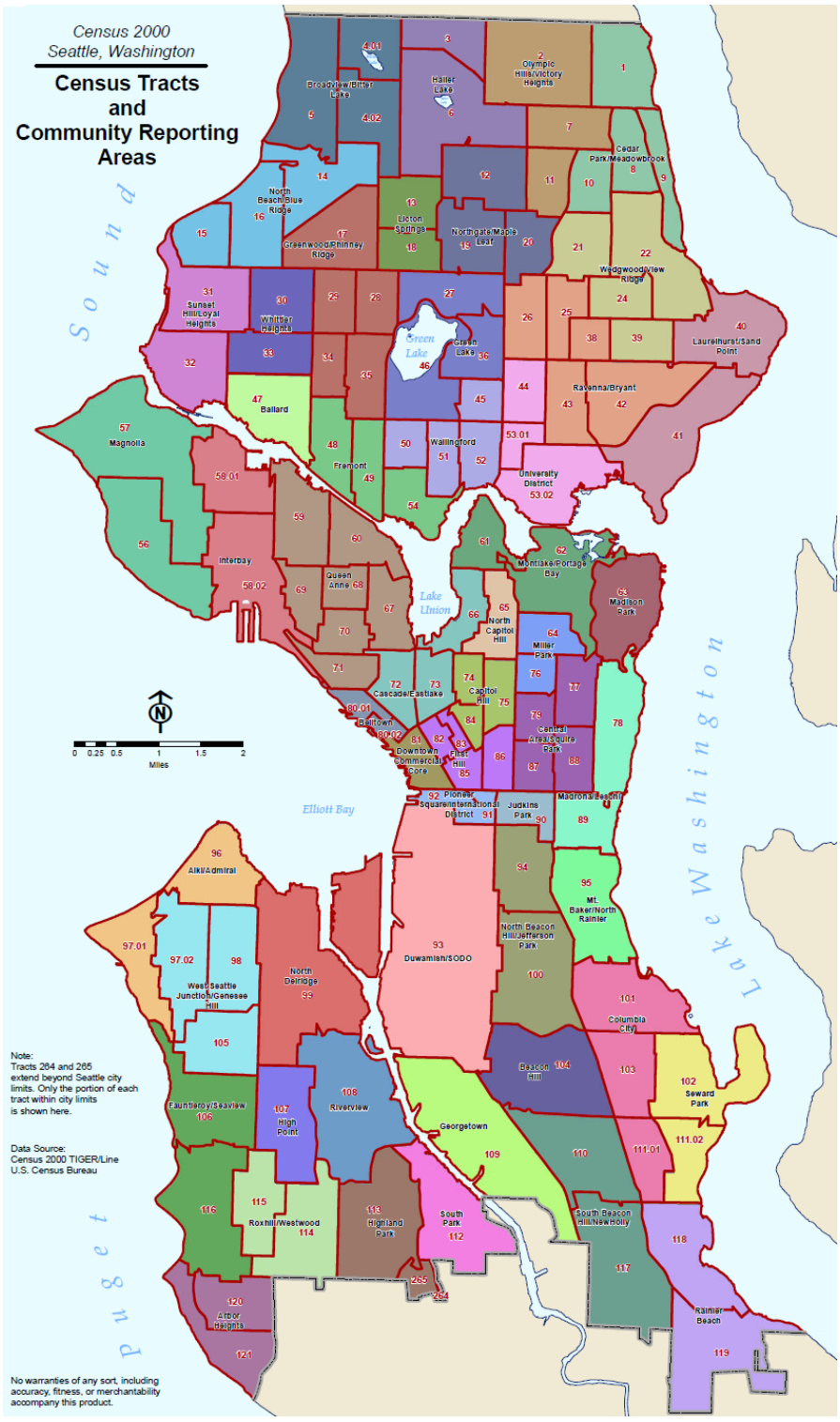
#### *3.5.2 Occupancy Load*

Like the occupancy class or use of the building, the occupancy load may be used by an RVS authority in setting priorities for hazard mitigation plans. The community may wish to upgrade buildings with more occupants first. As can be seen from the form (Figure 3-5), the occupancy load is defined in ranges such as 1-10, 11-100, 101-1000, and 1000+ occupants. The range that best describes the average occupancy of the building is circled. For example, if an office building appears to have a daytime occupancy of 200 persons, and an occupancy of only one or two persons otherwise, the maximum occupancy load is 101-1000 persons. If the occupancy load is estimated from building size and use, an inserted asterisk will automatically indicate that these are approximate data.

## 7.5 Appendix E: Map of Neighborhoods

The neighborhoods that are used in the data for the URM survey are the Community Reporting Areas shown in this map.

### Figure 59 Community Reporting Areas



## 7.6 Appendix F: Proposed Technical Standard

**URM Retrofit Proposal**

This proposal locates the requirements for unreinforced masonry building retrofits in a new chapter in the Seattle Municipal Code.

**Chapter 22.120 Unreinforced masonry buildings.**

**22.120.010 Definition of unreinforced masonry building.** A building with one or more bearing walls made of plain clay brick or clay tile masonry that provide the primary support for vertical loads from floors or roofs that was constructed prior to May 7, 1977.

**22.120.020 Selection of method.** All buildings, regardless of occupancy or number of stories shall either be shown to be in compliance with or altered to comply with one of the following methods:

(1) Section 1613 of the 2009 *Seattle Building Code*.
(2) ASCE 31-03 *Seismic Evaluation of Existing Buildings*. Life Safety performance level.
(3) ASCE 41-06 *Seismic Rehabilitation of Existing Buildings*, with supplement #1. Life Safety performance level.
(4) 2009 *International Existing Building Code*, Appendix A, Chapter A1.

The BSE-1 spectral response acceleration parameters as defined in Section 1.6.1.2 of ASCE 41-06 is permitted for methods (2) through (4).

**22.120.030 Use of alternate method**. Buildings that comply with or that are altered to comply with Items (1) through (6) or with Item (7) of this section may be strengthened in compliance with Section 22.120.040.

(1) The building does not have a vertical irregularity of Type 5A or 5B (Weak Story) as defined in ASCE 7-05 Table 12.3-2.
(2) The building has a mortar shear strength, $v_t$, as determined by Section A106.3.35 of the 2009 *International Existing Building Code*, of 30 psi or more for all masonry classes.
(3) The building has wood or plywood diaphragms at all levels above the base of the building.
(4) The building does not have straight-sheathed diaphragms without finished wood flooring with offset or perpendicular board edges.
    Exception: Straight-sheathed diaphragms without finished wood flooring with offset or perpendicular board edges are acceptable if any of the following conditions are met:
    a. The building has crosswalls below the non-compliant level as defined in Section A111.3 of the 2009 *International Existing Building Code* at a spacing that does not exceed 40 feet on center.
    b. The diaphragm span is less than 24 feet and the diaphragm aspect ratio is less than 2-to-1.
(5) The building has or will be provided with a minimum of two lines of vertical elements of the lateral force resisting system parallel to each axis. Masonry walls shall have wall piers with a

height-to-width ratio that does not exceed 2 to 1. Wall piers shall occupy not less than 40 percent of the wall's length for the wall to be considered as providing a line of resistance.

Exception: The above requirements for vertical elements do not apply if the owner submits a report prepared by a structural engineer licensed by the State of Washington that shows all walls comply with Section 22.120.020(2) with a maximum demand/capacity ratio of 2.0

(6) In buildings containing one or more party walls, Section 22.120.030 shall not be used unless each building sharing a party wall individually complies with all of the limitations set forth above and the owner of each such building consents to the use of the procedure in writing.

(7) Buildings that have undergone substantial alterations may be strengthened in compliance with Section 22.120.040 if it can be demonstrated that the building is in full compliance with the requirements of FEMA-178 with an Av, Aa=0.3.

**22.120.040 Alternate method.**

Elements shall be in compliance with or altered to comply with the requirements listed in this section:

| Elements | *2009 International Existing Building Code Section* |
|---|---|
| Wall Anchorage (tension bolts) | A113.1 |
| Diaphragm Shear Transfer (shear bolts) | A113.2 |
| Out-of-plane wall bracing | A113.5 |
| Parapets and appendage bracing | A113.7 (A113.6 2009 IEBC) |

The BSE-1 spectral response acceleration parameters as defined in Section 1.6.1.2 of ASCE 41-06 are permitted to be used.

## 7.7 Appendix G: Procedure to Challenge

### *Procedure to Challenge Unreinforced Masonry Building Designation*

The following process is available to owners who wish to remove their buildings from the list of URM bearing wall buildings.

1. Owner hires WA State licensed structural engineer.
2. Engineer evaluates building to determine if it is a URM building. Potential resources include:
    a. Seattle DCI-approved plans (e.g., via microfilm research)
    b. Visual survey
    c. Other methods (open up walls, minor demo, etc.)
3. Engineer writes report and submits to Seattle DCI:
    a. Evaluation must be accompanied by information that supports the engineer's conclusions.
        i. Microfilm research should include copies of microfiche
        ii. Visual surveys and other methods may be accompanied by photos
    b. Report must bear the engineer's stamp
    c. Seattle DCI Review Fee must be paid at submittal = flat rate of 1 hour (standard Seattle DCI hourly review rate at time of report submission; for 2016 this is $190.00)
4. Seattle DCI reviews report and will make one of the following determinations based on submitted materials only:
    a. Confirm that the building is not a URM bearing wall building, or
    b. Request further information for clarification
    c. Deny removal from list
5. Seattle DCI notifies owner of decision whether the building will be removed from the list.
6. Challenges that have been denied may be re-filed if new supporting information is provided. This additional review will be charged the Seattle DCI hourly rate.
7. Owners may request decisions be administratively reviewed, first by the Principal Engineer, then the Construction Codes Advisory Board, in accordance with the Seattle Building Code.

***NOTE***: Seattle DCI may consider information other than an engineering report to document lack of URM bearing walls. Documentation will be considered on a case-by-case basis in consultation with Seattle DCI engineering staff.

## 7.8 Appendix H: List of Buildings

The list is posted on the Seattle Department of Construction and Inspections website. It is available at this link:

http://www.seattle.gov/dpd/cs/groups/pan/@pan/documents/web_informational/p2422247.pdf

## 7.9 Appendix I: List of Buildings removed from list

This list includes buildings that were added and removed during the process of validating the URM list in 2015. Therefore, some of the buildings on this list were not on the 2012 published list of potential URMs.

**REMOVED FROM URM LIST**

| Neighborhood | Address | Yr Built | Stories | Status |
|---|---|---|---|---|
| Alki/Admiral | 2246 Alki Ave SW | 1926 | 1 | Not URM |
| Alki/Admiral | 4210 SW Admiral Way | 1926 | 1 | Demo |
| Alki/Admiral | 5817 SW Stevens St | 1954 | 1 | Not URM |
| Arbor Heights | 4220 SW 100th St | 1932 | 1 | Not URM |
| Ballard | 1400 NW Leary Way | | 1 | Not URM |
| Ballard | 1701 NW Market St | 1926 | 2 | Not URM |
| Ballard | 2001 NW Market St | 1906 | 1 | Not URM |
| Ballard | 2240 NW Market St | 1928 | 1 | Not URM |
| Ballard | 3040 NW Market St | | 4 | Appeal--Not URM |
| Ballard | 5209 Ballard Ave NW | 1900 | 1 | Not URM |
| Ballard | 5216 Ballard Ave NW | 1921 | 1 | Demo |
| Ballard | 5244 Leary Ave NW | 1929 | 1 | Not URM |
| Ballard | 5316 Ballard Ave NW | | | Demo |
| Ballard | 5319 Ballard Ave NW | 1927 | 1 | Not URM |
| Ballard | 5330 Ballard Ave NW | 1927 | 1 | Not URM |
| Ballard | 5334 Ballard Ave NW | 1909 | 1 | Not URM |
| Ballard | 5336 Ballard Ave NW | 1927 | 1 | Not URM |
| Ballard | 5415 22nd Ave NW | 1928 | 1 | Not URM |
| Ballard | 5420 Ballard Ave NW | 1948 | 1 | Not URM |
| Ballard | 5433 Ballard Ave NW | 1900 | 1 | Not URM |
| Ballard | 5439 Ballard Ave NW | 1903 | 2 | Not URM |
| Ballard | 5514 24th Ave NW | 1939 | 1 | Not URM |
| Ballard | 5919 15th Ave NW | | 2 | Not URM |
| Ballard | 6418-6420 24th Ave NW | | 1 | Demo |
| Beacon Hill | 5511 15th Ave S | 1927 | 3 | Not URM |
| Beacon Hill | 5900 Airport Way S | | | Demo |
| Belltown | 1902 2nd Ave | 1907 | 14 | Not URM |
| Belltown | 1926 2nd Ave | 1908 | 7 | Not URM |
| Belltown | 2000 2nd Ave | 1910 | 9 | Not URM |
| Belltown | 2013-2015 3rd Ave | | 2 | Demo |
| Belltown | 2313 3rd Ave | | 1 | Not URM |
| Broadview/Bitter Lake | 11544 Phinney Ave N | 1920 | 2 | Not URM |
| Capitol Hill | 1200-1210 E Pike St | 1900 | 3 | Demo |
| Capitol Hill | 1220 Boylston Ave | 1905 | 4 | Not URM |
| Capitol Hill | 127 Broadway E | | 3 | Demo |
| Capitol Hill | 1300 E Olive St | 1925 | 2 | Not URM |
| Capitol Hill | 1300 E Pike St | 1926 | 1 | Not URM |
| Capitol Hill | 1324 E Pike St | 1926 | 1 | Appeal--Not URM |
| Capitol Hill | 1401-1409 E Madison St | 1928 | 1 | Demo |
| Capitol Hill | 1406 10th Ave | 1915 | 2 | Demo |
| Capitol Hill | 1407 11th Ave | | 1 | Demo |
| Capitol Hill | 1411 Bellevue Ave | 1909 | 4 | Not URM |

## REMOVED FROM URM LIST

| Neighborhood | Address | Yr Built | Stories | Status |
|---|---|---|---|---|
| Capitol Hill | 1414 Bellevue Ave | | 3 | Bad Address |
| Capitol Hill | 1422 E Union St | 1928 | 4 | Not URM |
| Capitol Hill | 1426 Broadway | 1912 | 1 | Not URM |
| Capitol Hill | 1427 E Pike St | 1905 | 3 | Not URM |
| Capitol Hill | 1509 Broadway | 1911 | 1 | Not URM |
| Capitol Hill | 1510-1508 11th Ave | | | Demo |
| Capitol Hill | 1515 14th Ave | | | Demo |
| Capitol Hill | 1517 Boylston Ave | | | Not URM |
| Capitol Hill | 1519 12th Ave | 1926 | 2 | Not URM |
| Capitol Hill | 1522 14th Ave | 1912 | 2 | Not URM |
| Capitol Hill | 1525 11th Ave | 1916 | 2 | Not URM |
| Capitol Hill | 1530 11th Ave | 1926 | 1 | Demo |
| Capitol Hill | 1615 15th Ave | | | Not URM |
| Capitol Hill | 1616 Broadway | 1930 | 1 | Demo |
| Capitol Hill | 1631 Boylston Ave | 1907 | 3 | Not URM |
| Capitol Hill | 1710 11th Ave | 1932 | 1 | Not URM |
| Capitol Hill | 1714 13th Ave | 1938 | 1 | Not URM |
| Capitol Hill | 1720 12th Ave | 1919 | 1 | Demo |
| Capitol Hill | 1728 12th Ave | | 1 | Demo |
| Capitol Hill | 1729 12th Ave | 1925 | 3 | Appeal--Not URM |
| Capitol Hill | 1802 12th Ave | 1909 | 3 | Appeal--Not URM |
| Capitol Hill | 1816 Bellevue Ave | 1910 | 3 | Not URM |
| Capitol Hill | 1823 Nagle Pl | 1908 | 3 | Demo |
| Capitol Hill | 1824-1828 Broadway | | 2 | Demo |
| Capitol Hill | 1825 Nagle Pl | 1936 | 3 | Demo |
| Capitol Hill | 1830 Broadway | 1915 | 2 | Demo |
| Capitol Hill | 301-309 E Pine St | | 1 | Demo |
| Capitol Hill | 313-321 E Pine St | | 2 & 3 | Demo |
| Capitol Hill | 331 Bellevue Ave E | | | Accessory |
| Capitol Hill | 416 Broadway E | 1930 | 1 | Not URM |
| Capitol Hill | 417 E Pine St | 1919 | 5 | Not URM |
| Capitol Hill | 507 Harvard Ave E | 1926 | 3 | Not URM |
| Capitol Hill | 515 14th Ave E | | | Accessory |
| Capitol Hill | 600 E Pike St | 1909 | 1 | Demo |
| Capitol Hill | 601 E Pike St | | 1 | Demo |
| Capitol Hill | 604 E Union St | 1925 | 3 | Not URM |
| Capitol Hill | 604, 614 E Union St | 1925 | 3 | Appeal--Not URM |
| Capitol Hill | 615 Boren Ave | 1909 | 4 | Not URM |
| Capitol Hill | 714 E Pike St | | 2 | Demo |
| Capitol Hill | 725 E Pine St | | 1 | Demo |
| Capitol Hill | 802 E Pike St | 1912 | 2 | Not URM |
| Capitol Hill | 900 Boylston Ave | 1946 | 3 | Not URM |
| Cascade/Eastlake | 1013 Stewart St | | 1 | Demo |
| Cascade/Eastlake | 1017-1025 Stewart St | | 2 | Demo |
| Cascade/Eastlake | 1250 Denny Way | | | Demo |
| Cascade/Eastlake | 1816 8th Ave | | 1 | Demo |
| Cascade/Eastlake | 1820 Terry Ave | 1911 | 1 | Demo |
| Cascade/Eastlake | 1918 Terry Ave | 1949 | 1 | Not URM |
| Cascade/Eastlake | 1922 9th Ave | 1929 | 5 | Not URM |

## REMOVED FROM URM LIST

| Neighborhood | Address | Yr Built | Stories | Status |
|---|---|---|---|---|
| Cascade/Eastlake | 2002 4th Ave | 1925 | 9 | Not URM |
| Cascade/Eastlake | 201 Westlake Ave N | | 1 | Demo |
| Cascade/Eastlake | 2028 5th Ave | 1920 | 2 | Not URM |
| Cascade/Eastlake | 2320 4th Ave | 1922 | 2 | Not URM |
| Cascade/Eastlake | 307 Fairview Ave N | | 2 | Demo |
| Cascade/Eastlake | 334 Boren Ave N | | 1 | Demo |
| Cascade/Eastlake | 400 Dexter Ave N | 1930 | 1 | Demo |
| Cascade/Eastlake | 400 Yale Ave N | 1937 | 3 | Not URM |
| Cascade/Eastlake | 409 Eastlake Ave E | 1907 | 3 | Appeal--Not URM |
| Cascade/Eastlake | 412 Boren Ave N | | 2 | Demo |
| Cascade/Eastlake | 430 Dexter Ave N | 1928 | 1 | Demo |
| Cascade/Eastlake | 500 Minor Ave N | 1911 | 3 | Not URM |
| Cascade/Eastlake | 511 Boren Ave N | | | Not URM |
| Cascade/Eastlake | 515 Westlake Ave N | | 2 | Demo |
| Central Area/Squire Park | 1511 E Madison St | 1908 | 4 | Not URM |
| Central Area/Squire Park | 1519 E Howell St | 1926 | 2 | Not URM |
| Central Area/Squire Park | 1519 E Madison St | | 3 | Not URM |
| Central Area/Squire Park | 1605 E Howell St | | 3 | Bad Address |
| Central Area/Squire Park | 1708 E Pike St | 1926 | 3 | Not URM |
| Central Area/Squire Park | 1719 E Spring St | 1929 | 3 | Not URM |
| Central Area/Squire Park | 1732 18th Ave | 1911 | 3 | Not URM |
| Central Area/Squire Park | 1808 18th Ave | 1911 | 2 | Not URM |
| Central Area/Squire Park | 1812 E Madison St | 1925 | 2 | Not URM |
| Central Area/Squire Park | 2019-2021 E Denny Way | | 1 | Demo |
| Central Area/Squire Park | 2308 E Union St | 1928 | 2 | Not URM |
| Central Area/Squire Park | 2600 E Fir St | 1933 | 1 | Not URM |
| Central Area/Squire Park | 720 25th Ave | 1929 | 2 | Not URM |
| Columbia City | 12404 42nd Ave S | | 1 | Not URM |
| Columbia City | 3515 S Alaska St | 1921 | 2 | Not URM |
| Columbia City | 3528 S Ferdinand St | 1926 | | Not URM |
| Columbia City | 3815 S Edmunds St | 1935 | 2 | Not URM |
| Columbia City | 4213 S Orcas St | 1911 | 1 | Not URM |
| Columbia City | 4250 S Mead St | 1910 | 2 | Not URM |
| Columbia City | 4405 Rainier Ave S | 1926 | 2 | Not URM |
| Columbia City | 4501 Rainier Ave S | 1931 | 1 | Not URM |
| Columbia City | 4857 Rainier Ave S | 1927 | 1 | Not URM |
| Columbia City | 4908 Rainier Ave S | 1908 | 2 | Not URM |
| Columbia City | 5018 Rainier Ave S | 1922 | 1 | Not URM |
| Columbia City | 5100 Rainier Ave S | 1948 | 1 | Not URM |
| Columbia City | 5611 Rainier Ave S | 1904 | 2 | Not URM |
| Columbia City | 5620 Rainier Ave S | 1911 | 1 | Not URM |
| Columbia City | 6000 39th Ave S | 1953 | 1 | Not URM |
| Downtown | 110 Prefontaine Pl S | 1909 | 6 | Not URM |
| Downtown | 1409 5th Ave | 1910 | 2 | Not URM |
| Downtown | 420 4th Ave | 1924 | 2 | Not URM |
| Downtown | 512 2nd Ave | 1920 | 2 | Not URM |
| Downtown | 612 2nd Ave | 1904 | 15 | Not URM |
| Downtown | 705 2nd Ave | 1911 | 17 | Not URM |
| Downtown | 911 Western Ave | 1910 | 5 | Not URM |

## REMOVED FROM URM LIST

| Neighborhood | Address | Yr Built | Stories | Status |
|---|---|---|---|---|
| Duwamish/SODO | 1006 1st Ave S | 1918 | 1 | Not URM |
| Duwamish/SODO | 101 S King St | 1910 | 6 | Not URM |
| Duwamish/SODO | 1720 4th Ave S | 1959 | 1 | Not URM |
| Duwamish/SODO | 1743 1st Ave S | 1927 | 1 | Not URM |
| Duwamish/SODO | 3100 Airport Way S | 1939 | 2 | Not URM |
| Duwamish/SODO | 3100 Airport Way S | 1955 | 2 | Not URM |
| Duwamish/SODO | 401 S Jackson St | 1911 | 3 | Not URM |
| Duwamish/SODO | 416 Occidental Ave S | 1930 | 2 | Not URM |
| Duwamish/SODO | 4200 Airport Way S | 1922 | 2 | Demo |
| Duwamish/SODO | 538 1st Ave S | 1910 | 1 | Not URM |
| Duwamish/SODO | 541-547 1st Ave S | | 1 | Demo |
| Duwamish/SODO | 558 1st Ave S | 1910 | 5 | Not URM |
| Duwamish/SODO | 568 1st Ave S | 1909 | 6 | Not URM |
| Duwamish/SODO | 801 1st Ave S | 1900 | 1 | Demo |
| Duwamish/SODO | 90 S Dearborn St | 1921 | 2 | Demo |
| Duwamish/SODO | 902 1st Ave S | 1927 | 1 | Appeal--Not URM |
| Fauntleroy/Seaview | 4320 SW Myrtle St | 1910 | 3 | Not URM |
| Fauntleroy/Seaview | 4616 SW Graham St | 1926 | 2 | Not URM |
| Fauntleroy/Seaview | 6959 California Ave SW | 1947 | 1 | Not URM |
| First Hill | 1103 14th Ave | 1907 | 2 | Not URM |
| First Hill | 1128 13th Ave | 1923 | 3 | Not URM |
| First Hill | 120 14th Ave | 1928 | 2 | Not URM |
| First Hill | 1201 E Union St | 1920 | 2 | Not URM |
| First Hill | 1215 E Spring St | 1910 | 3 | Not URM |
| First Hill | 1305 E Union St | 1924 | 3 | Not URM |
| First Hill | 1319 E Union St | 1909 | 4 | Not URM |
| First Hill | 151 15th Ave | | 1 | Accessory |
| First Hill | 326 9th Ave | 1930 | 10 | Not URM |
| First Hill | 505 13th Ave | 1909 | 2 | Not URM |
| First Hill | 714 7th Ave | 1911 | 5 | Not URM |
| First Hill | 802 Terry Ave | 1923 | 3 | Not URM |
| First Hill | 901 12th Ave | 1900 | 3 | Demo |
| First Hill | 901 8th Ave | | 3 | Demo |
| First Hill | 905 Spruce St | | 3 | Demo |
| First Hill | 911 Pine St | 1928 | 9 | Not URM |
| First Hill | 917 James St | 1914 | 3 | Demo |
| Fremont | 3508 Fremont Ave N | 1906 | 2 | Not URM |
| Fremont | 3618 Woodland Park Ave N | 1925 | 2 | Not URM |
| Fremont | 3632 Woodland Park Ave N | 1926 | 2 | Not URM |
| Fremont | 3644 Woodland Park Ave N | 1926 | 3 | Not URM |
| Fremont | 3844 Fremont Ave N | 1930 | 2 | Not URM |
| Fremont | 417 N 36th St | 1929 | 1 | Not URM |
| Fremont | 425 NW Market St | 1926 | 1 | Not URM |
| Fremont | 4272 Fremont Ave N | 1914 | 2 | Appeal--Not URM |
| Fremont | 4301 Fremont Ave N | 1927 | 2 | Not URM |
| Fremont | 4416 Fremont Ave N | 1931 | 1 | Not URM |
| Fremont | 4453 Linden Ave N | 1928 | 3 | Not URM |
| Fremont | 501 N 36th St | 1927 | 1 | Not URM |
| Fremont | 503 N 50th St | 1930 | 2 | Not URM |

## REMOVED FROM URM LIST

| Neighborhood | Address | Yr Built | Stories | Status |
|---|---|---|---|---|
| Fremont | 704 N 34th St | 1927 | 3 | Not URM |
| Fremont | 707 N 35th St | 1907 | 1 | Not URM |
| Fremont | 717 N 36th St | 1924 | 3 | Not URM |
| Georgetown | 5511 Airport Way S | 1903 | 2 | Not URM |
| Georgetown | 5515-5519 Airport Way S | | 2 | Demo |
| Georgetown | 5609 Corson Ave S | 1926 | 2 | Not URM |
| Georgetown | 6009 12th Ave S | 1907 | 2 | Not URM |
| Green Lake | 2105 N 51st St | 1920 | 2 | Not URM |
| Green Lake | 333 NE 76th St | 1941 | 1 | Not URM |
| Green Lake | 412 NE 72nd St | 1926 | 1 | Not URM |
| Green Lake | 5411 Meridian Ave N | 1906 | 2 | Not URM |
| Green Lake | 6319 Roosevelt Way NE | 1925 | 1 | Not URM |
| Green Lake | 6846 Oswego Pl NE | 1927 | 1 | Not URM |
| Green Lake | 7610 Aurora Ave N | 1925 | 1 | Not URM |
| Green Lake | 7801 Roosevelt Way NE | 1908 | 3 | Not URM |
| Green Lake | 901 NE 75th St | 1907 | 2 | Not URM |
| Greenwood/Phinney Ridge | 225 N 70th St | 1956 | 1 | Not URM |
| Greenwood/Phinney Ridge | 312 N 67th St | 1929 | 1 | Not URM |
| Greenwood/Phinney Ridge | 316 N 70th St | 1929 | 1 | Not URM |
| Greenwood/Phinney Ridge | 5914 Phinney Ave N | 1920 | 1 | Not URM |
| Greenwood/Phinney Ridge | 6012 Phinney Ave N | 1922 | 1 | Not URM |
| Greenwood/Phinney Ridge | 6114 Phinney Ave N | 1922 | 1 | Not URM |
| Greenwood/Phinney Ridge | 6724 Greenwood Ave N | 1927 | 1 | Not URM |
| Greenwood/Phinney Ridge | 7103 Aurora Ave N | 1926 | 1 | Not URM |
| Greenwood/Phinney Ridge | 7217 Greenwood Ave N | 1918 | 1 | Not URM |
| Greenwood/Phinney Ridge | 7511 Greenwood Ave N | 1949 | 1 | Not URM |
| Greenwood/Phinney Ridge | 7717 Greenwood Ave N | 1948 | 1 | Not URM |
| Greenwood/Phinney Ridge | 7813 Aurora Ave N | 1923 | 1 | Not URM |
| Greenwood/Phinney Ridge | 8001 Greenwood Ave N | 1925 | 1 | Not URM |
| Greenwood/Phinney Ridge | 8402 Greenwood Ave N | 1931 | 1 | Not URM |
| Greenwood/Phinney Ridge | 8404 Greenwood Ave N | | 1 | Not URM |
| Greenwood/Phinney Ridge | 8415 Greenwood Ave N | 1925 | 1 | Demo |
| Greenwood/Phinney Ridge | 8421 Greenwood Ave N | 1926 | 1 | Not URM |
| Greenwood/Phinney Ridge | 8560 Greenwood Ave N | 1937 | 1 | Not URM |
| Greenwood/Phinney Ridge | 8570 Greenwood Ave N | 1941 | 1 | Not URM |
| Laurelhurst/Sand Point | 5001 NE 50th St | 1922 | 4 | Not URM |
| Laurelhurst/Sand Point | 6801 62nd Ave NE | 1939 | 2 | Not URM |
| Laurelhurst/Sand Point | 6831 62nd Ave NE | 1939 | 2 | Not URM |
| Laurelhurst/Sand Point | Magnuson Park | | | Accessory |
| Laurelhurst/Sand Point | Magnuson Park | | | Accessory |
| Licton Springs | 10311 Aurora Ave N | 1927 | 1 | Not URM |
| Madison Park | 4108 E Madison St | 1931 | 1 | Not URM |
| Madison Park | 4116 E Madison St | 1926 | 1 | Not URM |
| Madison Park | 4210 E Madison St | 1924 | 1 | Not URM |
| Madison Park | 4214 E Madison St | 1926 | 1 | Not URM |
| Madison Park | 4226 E Madison St | 1967 | 1 | Not URM |
| Madrona/Leschi | 1136 34th Ave | 1935 | 1 | Not URM |
| Madrona/Leschi | 1805 38th Ave | 1921 | 2 | Not URM |
| Madrona/Leschi | 1807 38th Ave | 1911 | 1 | Not URM |

## REMOVED FROM URM LIST

| Neighborhood | Address | Yr Built | Stories | Status |
|---|---|---|---|---|
| Madrona/Leschi | 3406 E Union St | 1924 | 1 | Not URM |
| Madrona/Leschi | 3611 E Denny Way | | | Not URM |
| Madrona/Leschi | 3615 E Denny Way | 1940 | | Not URM |
| Madrona/Leschi | 3620 E Howell St | 1940 | 2 | Not URM |
| Madrona/Leschi | 3710 E Howell St | | 2 | Not URM |
| Madrona/Leschi | 826 32nd Ave | 1911 | 2 | Not URM |
| Magnolia | 2414 31st Ave W | 1958 | 2 | Not URM |
| Miller Park | 309 18th Ave E | | 3 | Appeal--Not URM |
| Miller Park | 702 19th Ave E | | | Not URM |
| Miller Park | 720 18th Ave E | 1923 | | Not URM |
| Montlake/Portage Bay | 2400 11th Ave E | 1926 | | Demo |
| Montlake/Portage Bay | 2405 22nd Ave E | 1924 | 2 | Not URM |
| Mt. Baker/North Rainier | 1417 31st Ave S | 1926 | 1 | Not URM |
| North Beacon Hill/Jefferson Park | 1122 12th Ave S | | 2 | Not URM |
| North Beacon Hill/Jefferson Park | 1226 S Judkins St | | 2 | Not URM |
| North Beacon Hill/Jefferson Park | 1716 21st Ave S | 1920 | 1 | Not URM |
| North Beacon Hill/Jefferson Park | 2122 14th Ave S | 1928 | 2 | Accessory |
| North Beacon Hill/Jefferson Park | 2400 Beacon Ave S | 1928 | 1 | Not URM |
| North Beacon Hill/Jefferson Park | 2805 Beacon Ave S | 1932 | 1 | Not URM |
| North Beacon Hill/Jefferson Park | 2810 16th Ave S | 1930 | 3 | Not URM |
| North Beacon Hill/Jefferson Park | 3011 Beacon Ave S | 1925 | 2 | Not URM |
| North Delridge | 2914 SW Avalon Way | 1922 | 3 | Not URM |
| Northgate/Maple Leaf | 1059 NE 96th St | 1930 | 2 | Not URM |
| Northgate/Maple Leaf | 9634 Roosevelt Way NE | 1930 | 1 | Not URM |
| Olympic Hills/Victory Heights | 12348 Lake City Way NE | 1936 | 1 | Not URM |
| PS/CID | 101 Prefontaine Pl S | | 5 | Not URM |
| PS/CID | 1042 S Weller St | 1928 | 2 | Not URM |
| PS/CID | 108 2nd Ave S | 1909 | 2 | Not URM |
| PS/CID | 206 5th Ave S | 1924 | 2 | Not URM |
| PS/CID | 208 2nd Av Et S | | 6 | Bad Address |
| PS/CID | 210 2nd Av Et S | 1946 | 2 | Not URM |
| PS/CID | 223 Yesler Way | 1908 | 11 | Not URM |
| PS/CID | 404 5th Ave S | 1927 | 1 | Not URM |
| PS/CID | 409 8th Ave S | 1941 | 1 | Not URM |
| PS/CID | 504 5th Ave S | 1928 | 6 | Not URM |
| PS/CID | 513 S Main St | 1924 | 2 | Not URM |
| PS/CID | 514-526 S King St | | 4 | Not URM |
| PS/CID | 520 S King St | | 4 | Appeal--Not URM |
| PS/CID | 612 6th Ave S | 1920 | 1 | Not URM |
| PS/CID | 621 S Jackson St | 1915 | 6 | Not URM |
| PS/CID | 664 S Jackson St | 1917 | 3 | Not URM |
| PS/CID | 710 S Jackson St | 1916 | 1 | Not URM |
| PS/CID | 835 Yesler Way | | 2 | Demo |
| Queen Anne | 120 Crockett St | 1910 | 4 | Not URM |
| Queen Anne | 1305 1st Ave W | 1930 | 2 | Not URM |
| Queen Anne | 1500 Queen Anne Ave N | 1998 | 1 | Not URM |
| Queen Anne | 1902 5th Ave W | 1913 | 2 | Not URM |
| Queen Anne | 1932 Queen Anne Ave N | | 2 | Demo |
| Queen Anne | 1955 6th Ave W | 1913 | 2 | Not URM |

## REMOVED FROM URM LIST

| Neighborhood | Address | Yr Built | Stories | Status |
|---|---|---|---|---|
| Queen Anne | 2011 1st Ave N | 1925 | 3 | Not URM |
| Queen Anne | 2115 Queen Anne Ave N | 1920 | 1 | Not URM |
| Queen Anne | 221 W Lee St | 1911 | 2 | Not URM |
| Queen Anne | 317 W Galer St | 1913 | 1 | Not URM |
| Queen Anne | 3510 6th Ave W | 1928 | 2 | Demo |
| Queen Anne | 600 W McGraw St | 1923 | 2 | Not URM |
| Queen Anne | 610 W McGraw St | 1930 | 1 | Not URM |
| Queen Anne | 617 Queen Anne Ave N | 1906 | 2 | Not URM |
| Queen Anne | 700 Dexter Ave N | | 1 | Demo |
| Queen Anne | 8 Boston St | 1926 | 2 | Appeal--Not URM |
| Queen Anne | 9 Boston St | 1921 | 2 | Not URM |
| Ravenna/Bryant | 1410 NE 66th St | 1922 | 3 | Not URM |
| Ravenna/Bryant | 2912 NE 55th St | 1923 | 1 | Not URM |
| Ravenna/Bryant | 3311 NE 60th St | 1926 | 3 | Not URM |
| Ravenna/Bryant | 3410 NE 55th St | 1931 | 1 | Not URM |
| Ravenna/Bryant | 5751 33rd Ave NE | 1920 | 2 | Not URM |
| Ravenna/Bryant | 6500 20th Ave NE | 1930 | 2 | Not URM |
| Ravenna/Bryant | 6518 Roosevelt Way NE | 1923 | 2 | Not URM |
| Ravenna/Bryant | 6519 15th Ave NE | | 2 | Not URM |
| Ravenna/Bryant | 6550 Ravenna Ave NE | 1936 | 2 | Not URM |
| Ravenna/Bryant | 7751 15th Ave NE | 1934 | 1 | Not URM |
| Roxhill/Westwood | 9403 18th Ave SW | 1900 | 1 | Not URM |
| Roxhill/Westwood | 9615 20th Ave SW | 1924 | 2 | Not URM |
| South Park | 8401 8th Ave S | 1912 | 1 | Not URM |
| Sunset Hill/Loyal Heights | 2501 NW 80th St | 1931 | 2 | Not URM |
| Sunset Hill/Loyal Heights | 3052-3060 NW Market St | | 4 | Not URM |
| Sunset Hill/Loyal Heights | 3127 NW 85th St | 1928 | 1 | Not URM |
| Sunset Hill/Loyal Heights | 6015 24th Ave NW | | 3 | Not URM |
| Sunset Hill/Loyal Heights | 6415 32nd Ave NW | 1940 | 1 | Not URM |
| Sunset Hill/Loyal Heights | 7741 24th Ave NW | 1948 | 1 | Not URM |
| Sunset Hill/Loyal Heights | 8000 24th Ave NW | 1940 | 1 | Not URM |
| University District | 1415 NE 43rd St | 1926 | 2 | Not URM |
| University District | 1911 NE Skagit Ln | | | Not URM |
| University District | 2011 NE 45th St | | | Not URM |
| University District | 2012 NE Skagit Ln | | | Not URM |
| University District | 3940 Benton Ln NE | | | Not URM |
| University District | 3943 W Stevens Way NE | | | Not URM |
| University District | 4014 Brooklyn Ave NE | | 6 | Demo |
| University District | 4060 Spokane Ln NE | | | Not URM |
| University District | 4231 University Way NE | | 1 | Not URM |
| University District | 4548 Brooklyn Ave NE | 1928 | 1 | Not URM |
| University District | 4731 University Way NE | 1929 | 1 | Not URM |
| University District | 4737 Brooklyn Ave NE | 1924 | 3 | Not URM |
| University District | 5030 Roosevelt Way NE | 1937 | 2 | Appeal--Not URM |
| University District | 5804 15th Ave NE | 1910 | 3 | Not URM |
| University District | 5808 15th Ave NE | 1910 | 3 | Not URM |
| Wallingford | 1414 N 42nd St | 1914 | 1 | Not URM |
| Wallingford | 1601 N 45th St | 1921 | 1 | Demo |
| Wallingford | 1603 N 46th St | 1926 | 3 | Accessory |

## REMOVED FROM URM LIST

| Neighborhood | Address | Yr Built | Stories | Status |
|---|---|---|---|---|
| Wallingford | 1609 N 46th St | 1926 | 3 | Accessory |
| Wallingford | 1610 N 41st St | 1928 | 3 | Not URM |
| Wallingford | 1711 N 45th St | | 1 | Not URM |
| Wallingford | 1715 N 45th St | 1929 | 2 | Not URM |
| Wallingford | 1911 N 46th St | | | Accessory |
| Wallingford | 1916 N 45th St | 1916 | 1 | Not URM |
| Wallingford | 2102 N 40th St | 1952 | 1 | Not URM |
| Wallingford | 2110 N 45th St | 1906 | 2 | Not URM |
| Wallingford | 2113 N 42nd St | 1937 | 1 | Not URM |
| Wallingford | 2121 N 45th St | 1925 | 1 | Not URM |
| Wallingford | 250 NE 45th St | 1928 | 2 | Not URM |
| Wallingford | 2510 N 45th St | 1938 | 1 | Not URM |
| Wallingford | 261 NE 45th St | 1926 | 1 | Not URM |
| Wallingford | 305 NE 45th St | 1937 | 2 | Not URM |
| Wallingford | 400 NE 42nd St | 1918 | | Not URM |
| Wallingford | 4405 Corliss Ave N | 1926 | 3 | Not URM |
| Wallingford | 5062 9th Ave NE | 1914 | 2 | Not URM |
| Wallingford | 722 NE 45th St | 1923 | 1 | Not URM |
| Wallingford | 901 NE 43rd St | 1926 | 3 | Not URM |
| West Seattle Junction/Genesee Hill | 2348 Alki Ave SW | 1928 | 2 | Not URM |
| West Seattle Junction/Genesee Hill | 2611 California Ave SW | 1924 | 2 | Not URM |
| West Seattle Junction/Genesee Hill | 2700 California Ave SW | 1915 | 2 | Not URM |
| West Seattle Junction/Genesee Hill | 3211-3215 California Ave SW | | 2 | Demo |
| West Seattle Junction/Genesee Hill | 3235 California Ave SW | | 1 | Not URM |
| West Seattle Junction/Genesee Hill | 3237 California Ave SW | | 1 | Demo |
| West Seattle Junction/Genesee Hill | 3405 California Ave SW | | 1 | Not URM |
| West Seattle Junction/Genesee Hill | 3429 45th Ave SW | 1928 | 3 | Not URM |
| West Seattle Junction/Genesee Hill | 3811 California Ave SW | | 1 | Demo |
| West Seattle Junction/Genesee Hill | 4302 SW Alaska St | | | Not URM |
| West Seattle Junction/Genesee Hill | 4315 SW Oregon St | | | Appeal--Not URM |
| West Seattle Junction/Genesee Hill | 4403 SW Admiral Way | | | Appeal--Not URM |
| West Seattle Junction/Genesee Hill | 4444 California Ave SW | 1942 | 1 | Not URM |
| West Seattle Junction/Genesee Hill | 4445 California Ave SW | 1908 | 2 | Not URM |
| West Seattle Junction/Genesee Hill | 4461 California Ave SW | 1940 | 1 | Not URM |
| West Seattle Junction/Genesee Hill | 4513 California Ave SW | 1935 | 1 | Not URM |
| West Seattle Junction/Genesee Hill | 4517 California Ave SW | 1927 | 2 | Not URM |
| West Seattle Junction/Genesee Hill | 4520 California Ave SW | 1926 | 2 | Not URM |
| West Seattle Junction/Genesee Hill | 4538 California Ave SW | 1948 | 1 | Not URM |
| West Seattle Junction/Genesee Hill | 4546 California Ave SW | 1930 | 2 | Not URM |
| West Seattle Junction/Genesee Hill | 4548 California Ave SW | 1929 | 2 | Not URM |
| West Seattle Junction/Genesee Hill | 4704-4712 California Ave SW | 1925 | 2 | Demo |
| West Seattle Junction/Genesee Hill | 4831 35th Ave SW | 1922 | 5 | Not URM |
| Whittier Heights | 1403 NW 70th St | 1917 | 2 | Not URM |
| Whittier Heights | 1411 NW 70th St | 1926 | 1 | Not URM |
| Whittier Heights | 1414 NW 70th St | | 1 | Not URM |
| Whittier Heights | 1418 NW 65th St | | | Demo |
| Whittier Heights | 2054 NW 61st St | 1930 | 1 | Not URM |
| Whittier Heights | 6210 15th Ave NW | | 1 | Not URM |
| Whittier Heights | 6301 20th Ave NW | 1910 | 2 | Not URM |

## REMOVED FROM URM LIST

| Neighborhood | Address | Yr Built | Stories | Status |
|---|---|---|---|---|
| Whittier Heights | 6512 12th Ave NW | 1940 | 1 | Not URM |
| Whittier Heights | 6720 15th Ave NW | 1934 | 1 | Not URM |
| Whittier Heights | 7515 15th Ave NW | | 1 | Not URM |